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POPULAR SCIENCE

OCTOBER • 35¢ *Monthl*



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plus

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- ▶ Details on the New Chevy II
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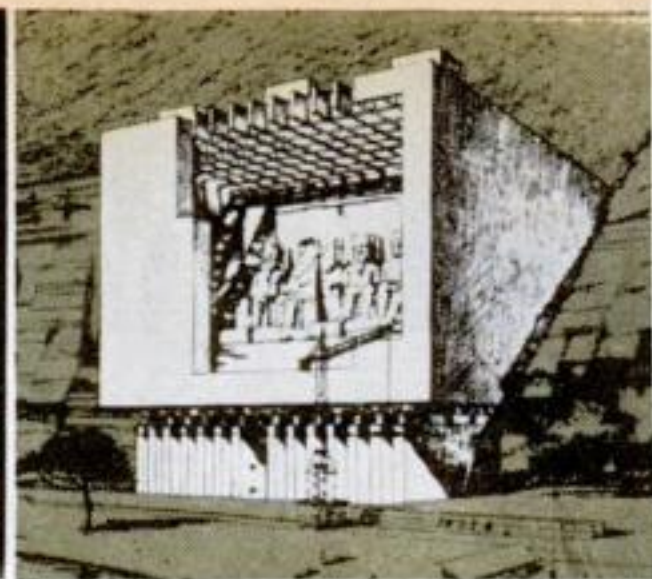
California residents add 4% state sales tax.



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Popular Science

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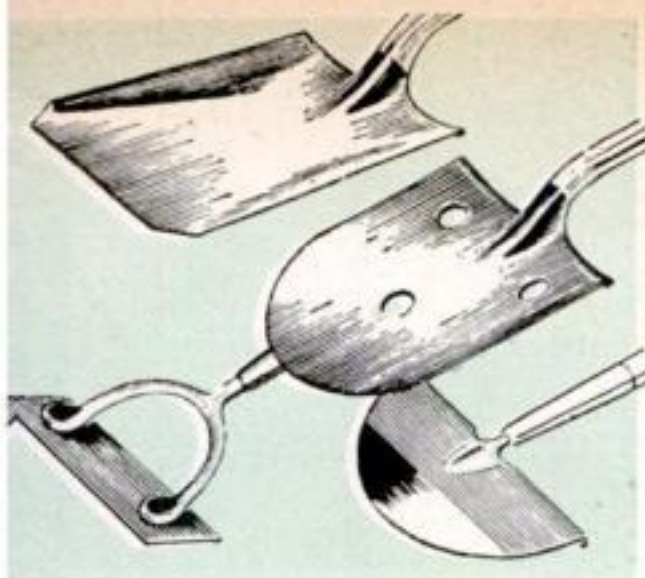
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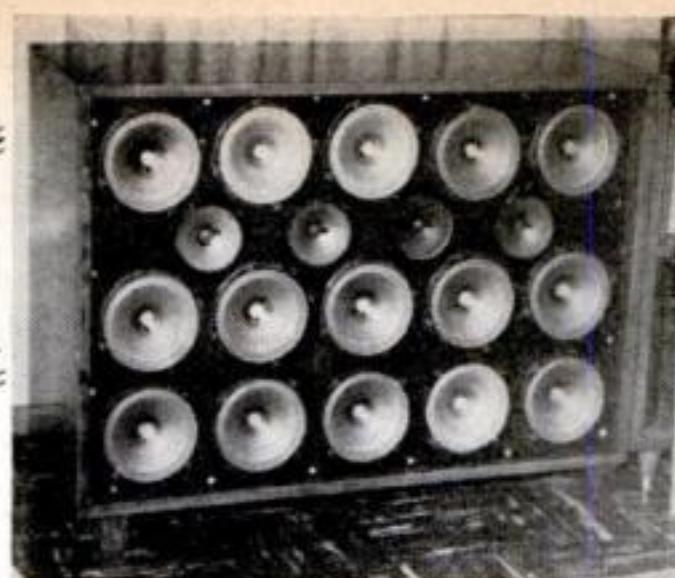
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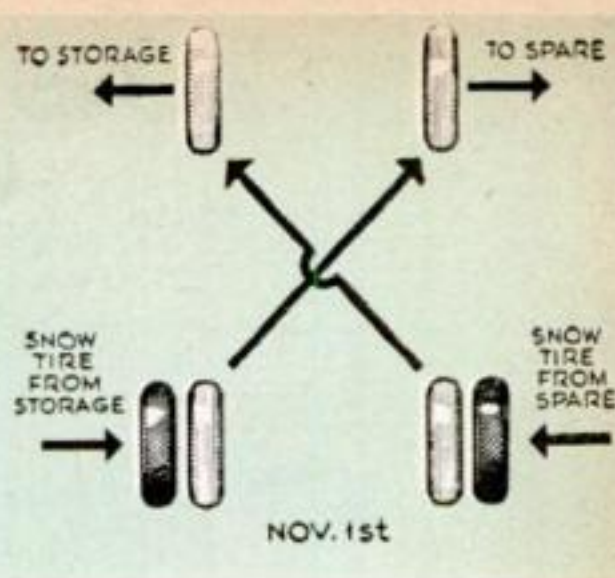
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PS Readers

TALK BACK



Facts or Fallacies?

I AM deeply shocked at the generous space accorded Herman Kahn's manual for mass murder ["Facts and Fallacies of World War III," July]. His evil book has probably contributed more than any other to the doubts rampant in the world as to our national rationality.

Will you also please cease this periodic nonsense about Russia raising the water level by melting the polar ice just to spite us. Has it occurred to your Mr. Mann and his associates that the Russians have a coastline, too?

PROF. JOHN E. ULLMANN
Stevens Inst. of Tech.
Hoboken, N. J.

The Russians have a very long coastline—with practically no cities on it. Raising the sea level would cripple us but merely annoy them.

. . . HEARTY congratulations to you and your staff for printing the fine review of Kahn's *On Thermonuclear War*.

Those who refer to Kahn as "inhuman" and "obscene" for writing such a book display an unscientific stance in regard to one of our civilization's most disturbing problems. Evidently they prefer burying their heads in the sand to investigating the grotesque world situation as scientists.

May I suggest that Mr. Kahn write an article concerning the scientist's obligation to investigate openly the thermonuclear-war problem?

CHARLES W. COE, Hillsboro, N. M.

He Was There

CONGRATULATIONS on "The Man Who Pinned Wings on the Navy" [July]. It is the best and most accurate story on

.....
Curtiss I have read, and I was with him at that time.

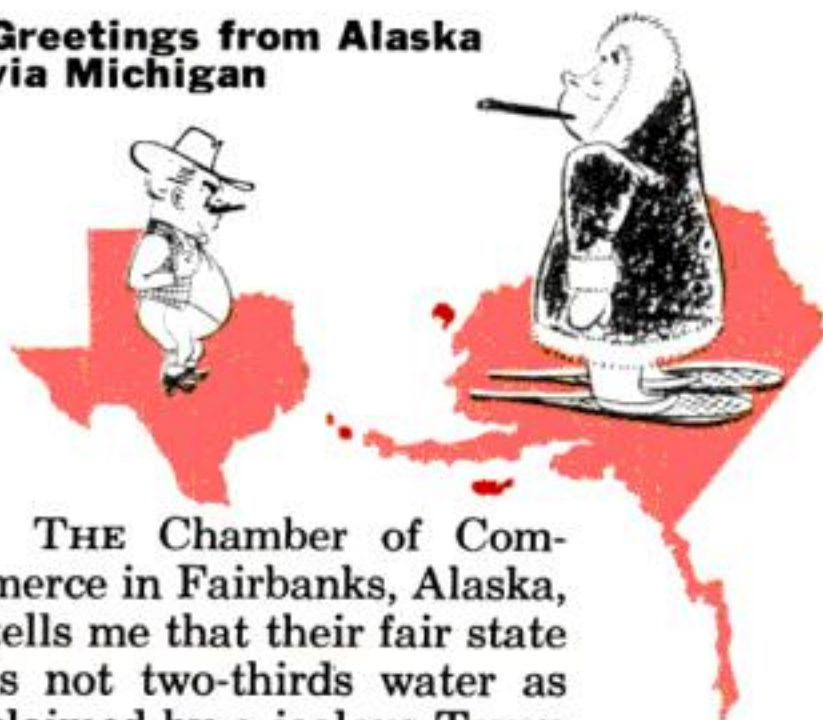
BECKWITH HAVENS, NYC.

Tenting in Plastic

I READ with interest your article on lightweight-plastic tents ["How to Make a Tent for Five Bucks," June] because my son and I have been making shelters of this material for the past two seasons. We've settled on the Baker or Whelen design (with front canopy) for all-season usage when traveling light. For winter camping, we find that it helps to coat one side of the plastic with a light spray of aluminum enamel. This does an excellent job of reflecting heat from a campfire back into the tent.

R. E. STINSON, Mayfield, Mich.

Greetings from Alaska via Michigan



THE Chamber of Commerce in Fairbanks, Alaska, tells me that their fair state is not two-thirds water as claimed by a jealous Texan ["PS Readers Talk Back," May].

It isn't even one-third water. Alaska is 586,400 square miles, or $2\frac{1}{2}$ times the size of Texas. Thus, the land area is much larger than Texas. In addition, its coastline stretches 33,904 miles, exceeding all of the U. S. coasts combined. Fairbanks has spoken.

E. C. FUSER, St. Ignace, Mich.

Gus Gets Some Competition

JUST read about checking a car's battery acid with a mirror ["Hints from the Model Garage," July] and thought some readers might like to know my method: Buy a $\frac{1}{4}$ -inch glass feeding tube at any

BIG JOB BOOM FORECAST!

Can You Get Ready in Time?

Right now job opportunities are tight all along the line. Economists now predict a period of mild ups and downs. Look for the "big break" to come in the next three years, they say. That's when good jobs will open up as never before. And men who are preparing themselves *now* will ride the crest of the boom.

DARK OUTLOOK FOR UNSKILLED WORKERS

Those with little or no training will find the going tough. Fewer openings. More competition for existing jobs. The tide is against the unskilled worker. It's getting stronger. Nor will the boom help. The new opportunities will go first to the skilled, next to the semi-skilled.

BIGGEST DEMAND IN THESE FIELDS

What's ahead? According to the best estimates, here are the industries due for the sharpest employment rise: Heavy transportation equipment. Mechanical, electrical, chemical, aeronautical and highway engineering. Industrial electronics.

All metals. Business services. Natural gas and oil. Paper products. On the other end of the scale, employment may lag in agriculture and leather. Check the trends in *your* field. Are you prepared to switch, if necessary?

GETTING YOURSELF READY—NOW

All the experts agree: Education, skill, specialized training will net the greatest rewards in the coming boom. The time you spend improving yourself is perhaps the wisest investment you can make *right now*. Your future success and happiness could hinge on your mastering a certain subject or acquiring a special skill. But there are obstacles. You may have a family to support. Or a job to hold down. You may feel you're too old to learn.

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- ☐ Auto Engine Tuneup
- ☐ Auto Electrical Technician
- ☐ Diesel Engines

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- ☐ Aviation Engine Mech.
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drug store and cut off about five inches. Put the tube in the cell until it hits the plates, place your thumb over the open end of the tube and remove the tube from the cell. The height of acid in the tube will show how much acid you have over the plates. Remove your thumb from the tube and let the acid drain back into the cell.

F. B. SKINNER, Portland, Ore.

... YOUR method of checking valve and clutch springs for proper strength ["Hints from the Model Garage," July] is unnecessarily complicated. By just setting a bathroom scale on a drill-press table and compressing the spring with the spindle, you can eliminate any calculations. If no drill press is available, any positive leverage will do.

M. L. LALIBERTE, San Diego.

Have You Seen This Man?

SINCE POPULAR SCIENCE has many readers in the garage and service-station business, perhaps you can help the FBI locate a fugitive who is known to be a skilled mechanic. Most recently he was the owner of a garage that specialized

in the repair of automatic transmissions. James Marvin Tuttle (also known as "Tut") is charged with unlawfully fleeing, about July 31, 1960, from Orange County, Calif., to Detroit, Mich., to avoid prosecution for rape.

Tuttle is 37 years old, white, 5 feet 1 or 2 inches tall, weighs 130 pounds, has blue eyes and light brown hair. He has scars on both cheeks and at base of nose. Walks with limp; may wear built-up



left shoe. He reportedly carries an automatic pistol in pocket or car and should be considered armed and dangerous.

Anyone having information concerning his whereabouts, please contact your local FBI office.

H. G. FOSTER, Special Agent in Charge, FBI, NYC.

Did Chiropractors Get There First?

"You, Too, May Revive the Dead" ["The Month in Science," July] speaks of external heart massage as a new tech-

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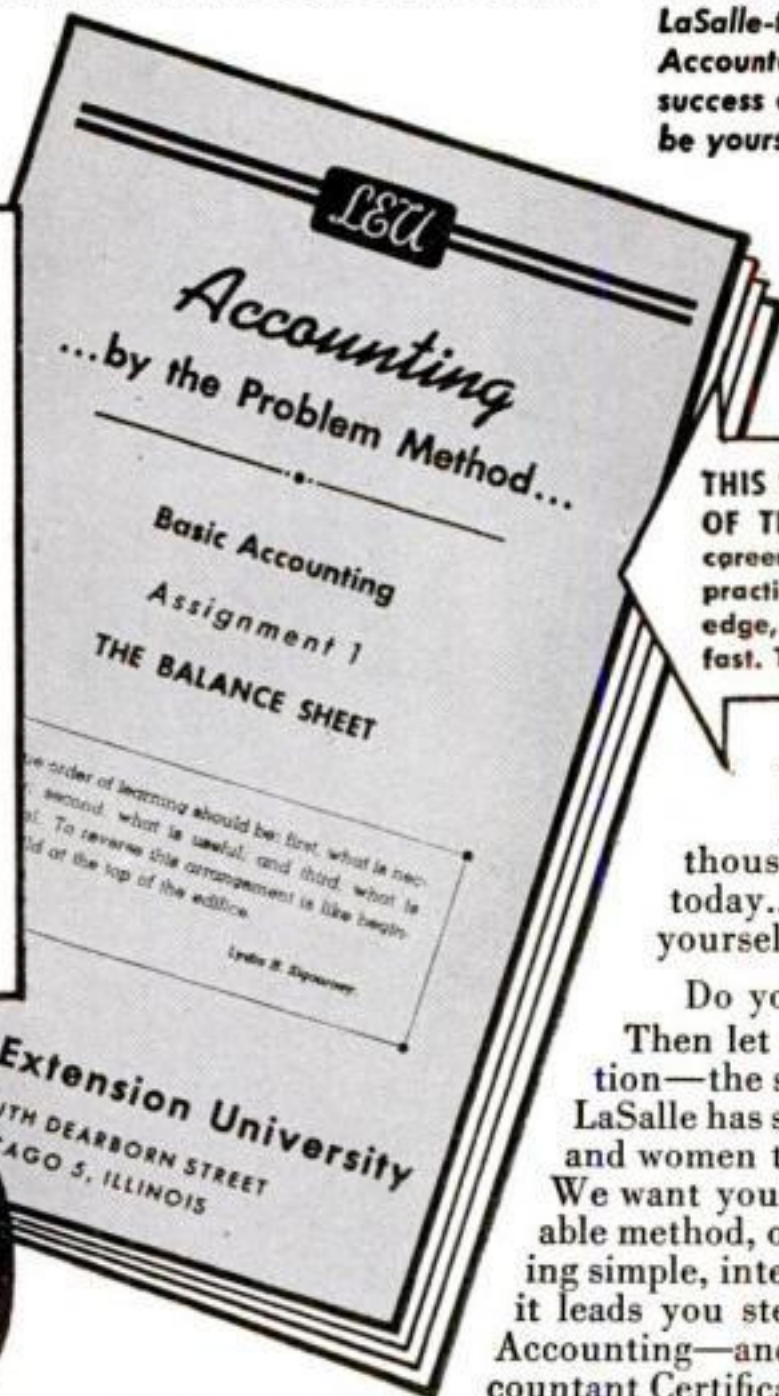


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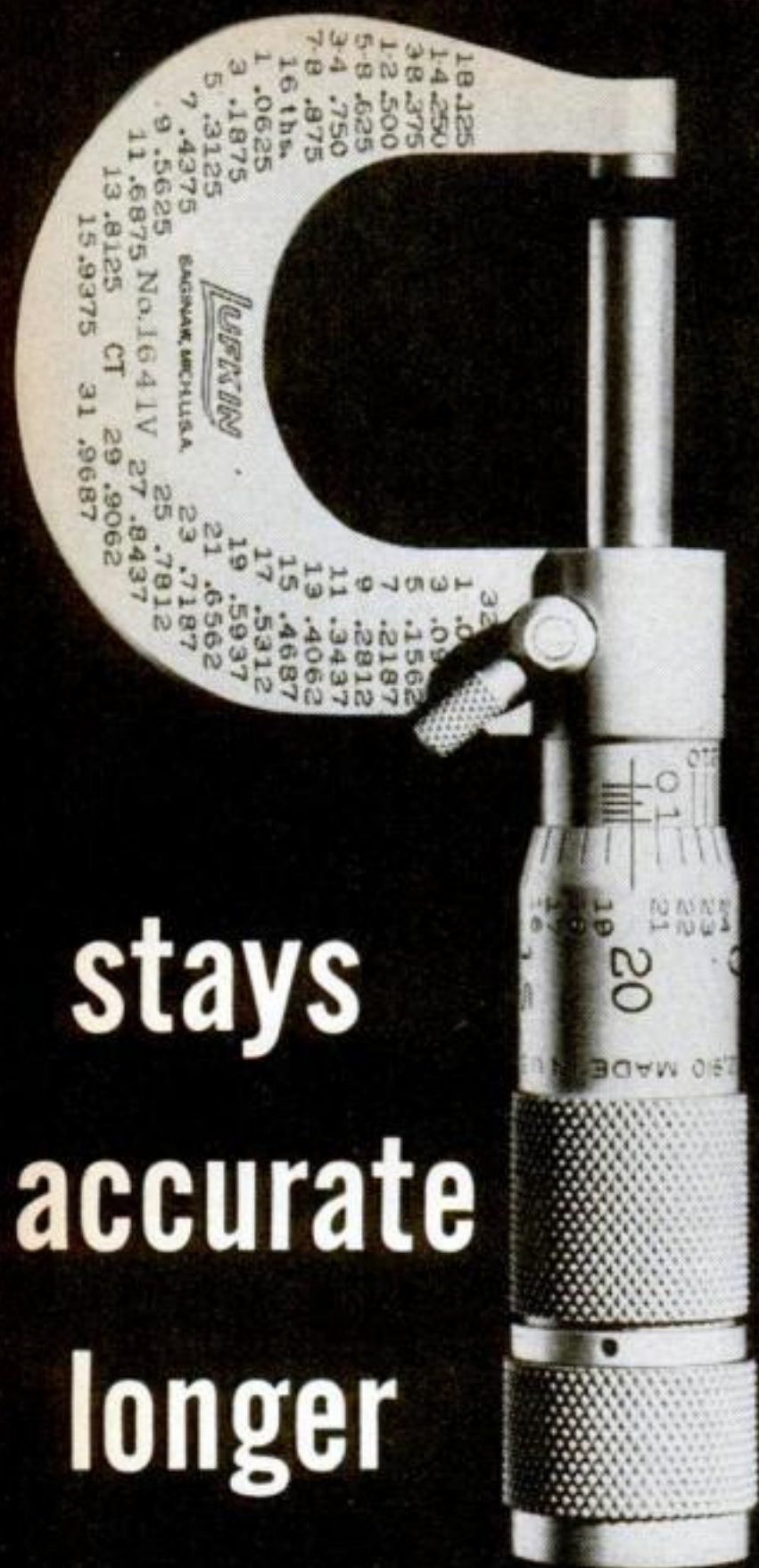
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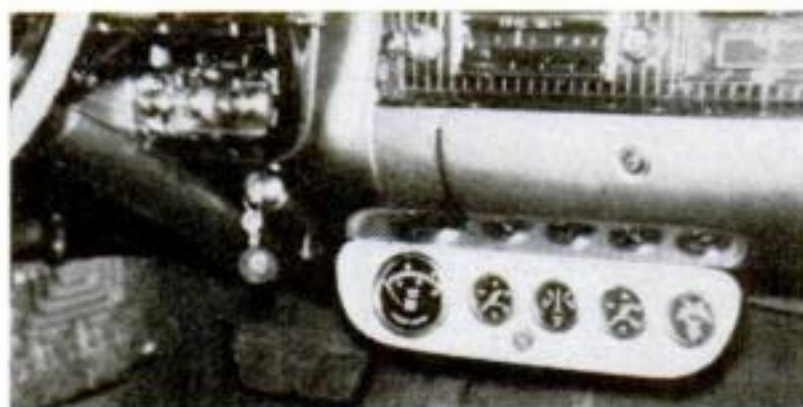
nique. This is not so. Nor did Drs. Jude, Kouwenhoven, and Knickerbocker discover it.

I was taught this technique eight years ago by Dr. Frank E. Dean of the Columbia College of Chiropractic, Baltimore, Md. A number of colleagues with whom I graduated will be happy to validate this statement.

THOMAS J. GOUGH, D. C., NYC.

Gauging Performance

AFTER reading "Let's Bring Back the Missing Gauges" [July], I took this picture of the dashboard in my '56 Cadillac.



I've installed a tachometer, an engine oil-pressure gauge, an ammeter, a Hydra-Matic oil-pressure gauge (marked "full pressure" because that's all I could get that was good for 200 pounds' pressure), and an engine-vacuum gauge. The panel itself is a Corvair glove-compartment door. This is admirably suited for the purpose as it is flat, sturdy, and completely finished.

With mechanical pressure gauges, it is necessary to have a nonmetallic connection in the line. Otherwise, noise transmitted through the copper tubing to the instrument panel is quite annoying. I use a short oil-filter hose for engine oil pressure, and a power-steering control-valve hose for the transmission.

S. E. MILLER JR., Tarrytown, N. Y.

No Mistake

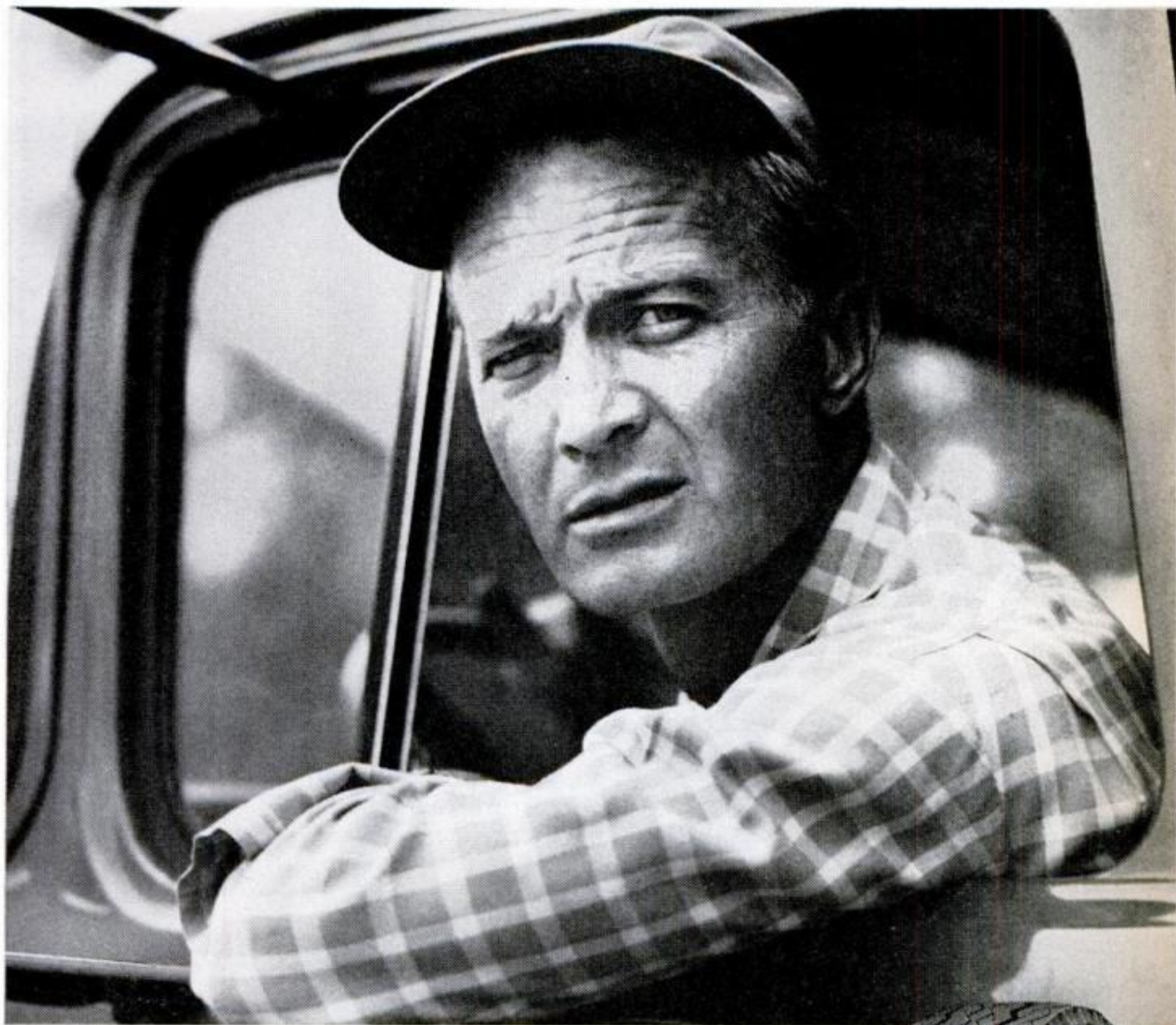
I've been hoping to try your formula for "Restoring Brightness to Coated Metals" [July]. So far, I've talked to three druggists and two chemists and the consensus is that an error was made in specifying aniline. They seem to think that somewhere along the line the word anAline was misspelled. Please advise.

S. A. VATTER, Grand Rapids.

Aniline is the correct name and the name most commonly used by chemists. The chemical formula is $C_6H_5NH_2$ and

CONTINUED

50% MORE TIRE MILES?



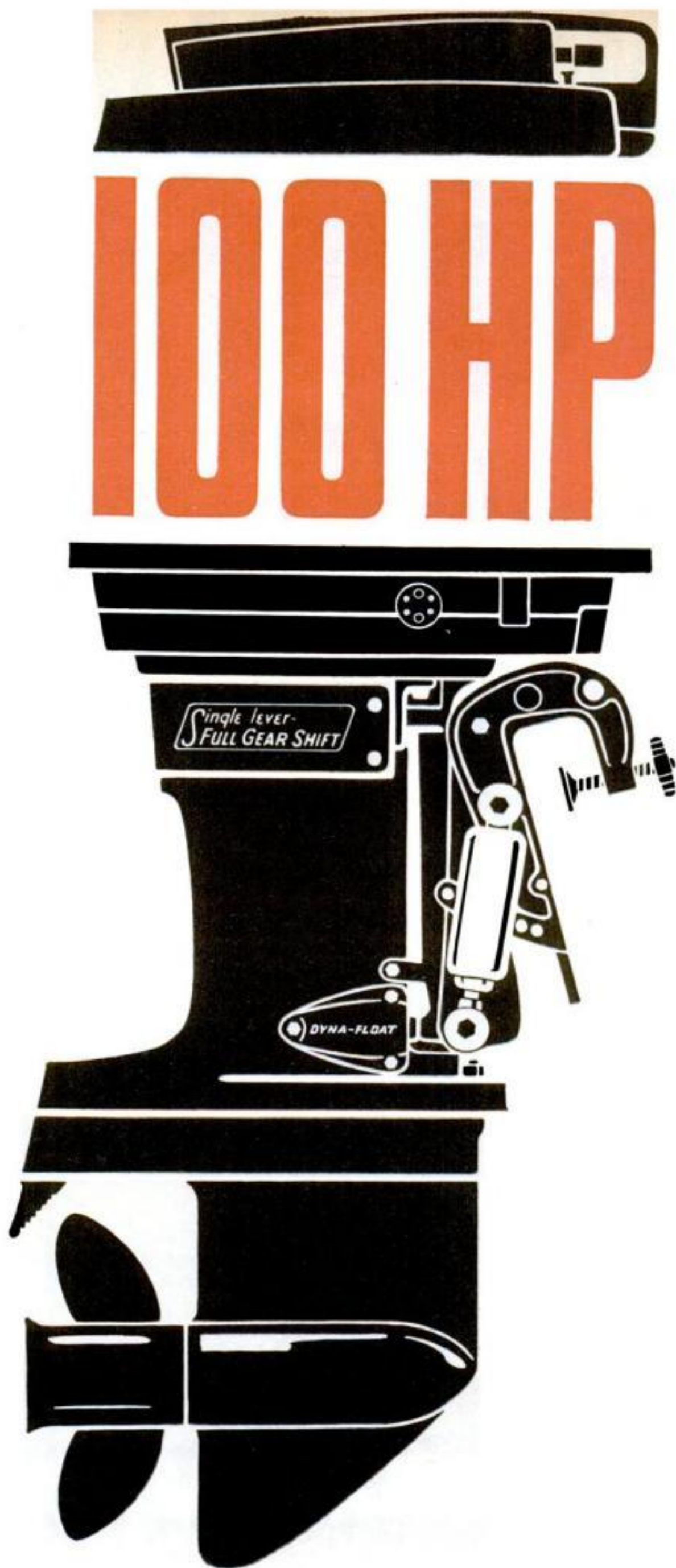
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Says who? (We do—and here's proof!)

When fleet tests of the new Firestone Transport-100 hit 109,000,000 miles, we knew we *had* something! Findings: up to 50% more original tread mileage and much greater drive wheel traction. It requires only $\frac{2}{3}$ the stopping distance most other truck tires took on wet pavements. With a new 3-rib tread design, built with Firestone Rubber-X and Shock-Fortified cord bodies, the Firestone Transport-100 comes to you at no extra cost. In nylon or Tyrex® rayon cord, tubeless or tubed, at your Firestone Dealer or Store.

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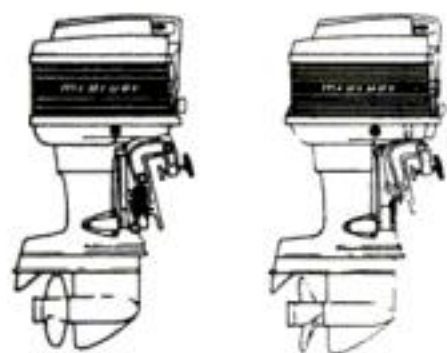




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Mercury's news in 6-cylinder engines 85 hp, with Mercury's new *Power-smoother* idle, quicker response to operation. It outperforms any for versatility you can't beat, see



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. . . a light, handsome work horse for fishing, hunting . . . even skiing. Then there's the entirely new Merc 110 . . . 9.8 hp . . . in a 55-pound package . . . 20% lighter than other 10's and



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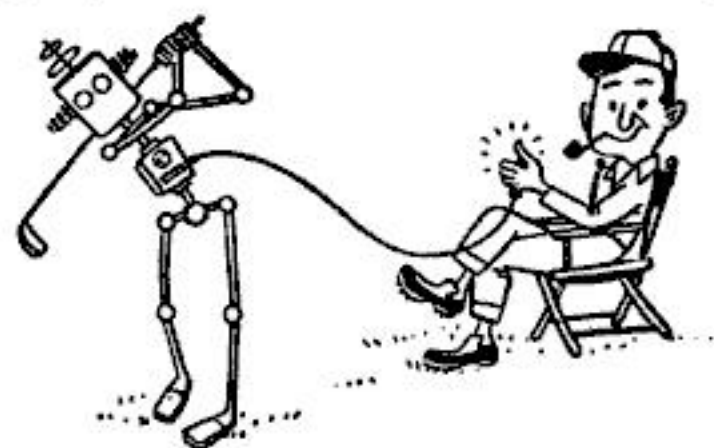
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constitutes complete identification. Aniline is sometimes called phenylamine, aminobenzene, phenylid, cyanol, aniline oil, benzdiam, and may be written PhNH_2 .

Gripe from a Golfer

THIS year, a no-stoop gripper for teeing a golf ball ["New Ideas from the Inventors," June]; last year, a club tip for retrieving balls [July '60]. These inventors are going too far; they're destroying the fun and exercise in golf.



Next year: a gadget that drives, chips, and putts to make the game easier?

ROBERT LAFOND, San Diego.

Which Came First?

Your Picture News [June] showed an interchangeable truck top or canopy and credited its design to Capt. M. W. Dickerson of Langley Air Force Base, Va.

I don't know who adopted or thought of this idea first, but I do know that I designed and had constructed the very same type of truck canopy five or six years ago. It was used for transporting specialists, tools, and equipment for maintenance on the flight line at Offutt Air Force Base, Nebr.

The canopies we use include seats on both sides. The whole assembly can be lifted from one 1/4-ton truck to another in a few minutes by four men.

M/SGT. W. G. CHYLINSKI,
Bellevue, Nebr.

To Keep a Wagon Clean

FLAPS for the rear of station wagons ["I'd Like to See Them Make," June] are on the market, but I think "scoops" do a better job; and you don't have to get on your hands and knees to clean them. They come in pairs—chromed metal sheets, curved lengthwise.

They're mounted on the tail gate, one on each side, adjusted to "scoop" the wind, bringing it around behind and kill-

CONTINUED



Tempest '62 is here!

Fancy mover! Gas-saving 4-cylinder engine delivers Pontiac-brand performance in horsepowers ranging from 110 to 140. Extra-cost: 4-barrel, 166 h.p. "four" or 185 h.p. V-8. Automatic trans or 4-speed floor shift • Independent springing front and rear. Each 15" wheel moves up and down independently of the opposite wheel. Rides flat and level. • Only American car with a front engine/rear transmission. Biting traction on bricks or mud. • **Plush new series—the Le Mans (Luh-mahnz)—makes the scene this year in Convertible and Coupe models. Sports-type bucket seats, full carpeting. Take one out.**

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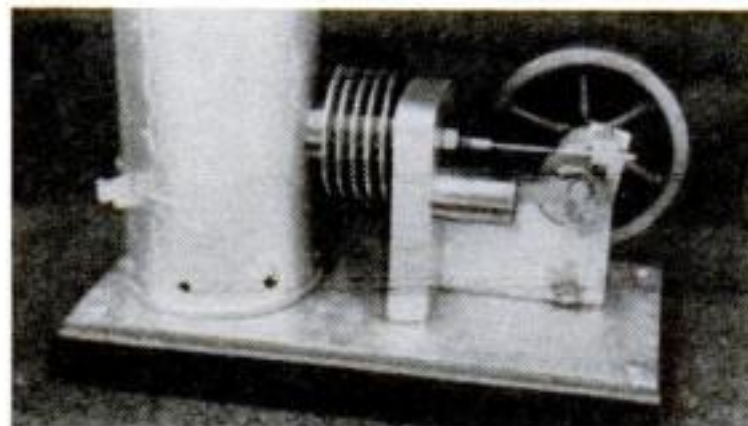
Discharge date..... MS-117

ing the vacuum. I have them on my station wagon. They look better than flaps and keep the back glass dry and clean.

K. B. KARSTENS, Richmond, Calif.

Hot-Air Engine Is Real Cool

I SURE hope you'll come up with more projects like Harry Walton's little hot-air engine [Apr. '61]. The picture shows



how I made out when I tackled it. I built the engine out of material from my "hope chest" and it performs very well. I found the timing was quite critical for good performance. I've been building mechanical models for more than 50 years and I don't suppose I'll ever outgrow it.

M. D. TAYLOR, Soquel, Calif.

Why Cars Like Foggy Weather

It is my idea, rooted in the notorious experience of many drivers, that cars seem to drive better on foggy days. The engine seems eager and more powerful, and knock is greatly reduced. This is due, I think, to the water which on foggy days saturates the air. The water is mixed with the air and gasoline and, in the engine's combustion chamber, becomes superheated steam which yields additional power.

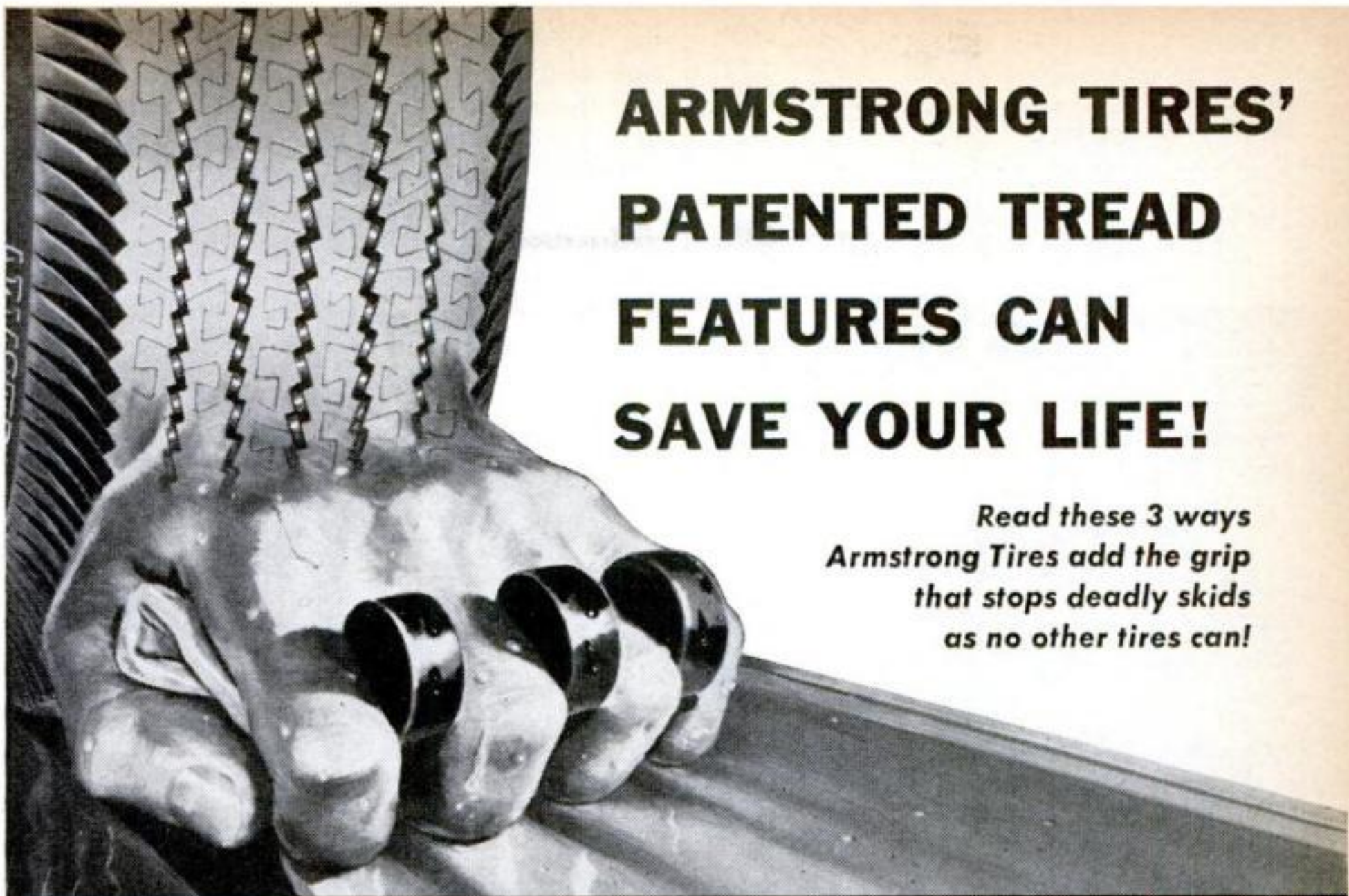
Well, I hope this didn't kill you with laughter and that you can give me some explanation of just what does go on in an engine on wet days.

R. SCHMIDT, Caracas, Venezuela.

Almost everyone has noticed this phenomenon on damp days. It is generally believed to be due to the presence of more oxygen in dense air than in the thin air of a hot, dry day. The more oxygen, the better the combustion. That's why your car seems to run on a cloud when it's running under one.

Soap to the Rescue

I AM a real Gus fan and I often get a chuckle out of the weird things that hap-



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Just as Safety Discs in fist (above left) keep fingers apart, so over 1000 Safety Discs in each Armstrong Tire keep tread's gripping edges apart, always ready to grip — no matter how hard you brake!

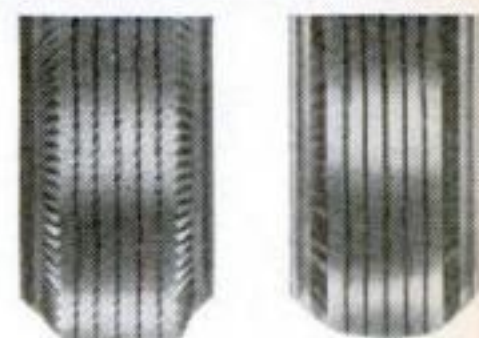
But fingers of fist *without* discs (above right) can squeeze shut. That's why ordinary tires, lacking Safety Discs, can squeeze smooth and slippery under braking pressure — *and you skid.*



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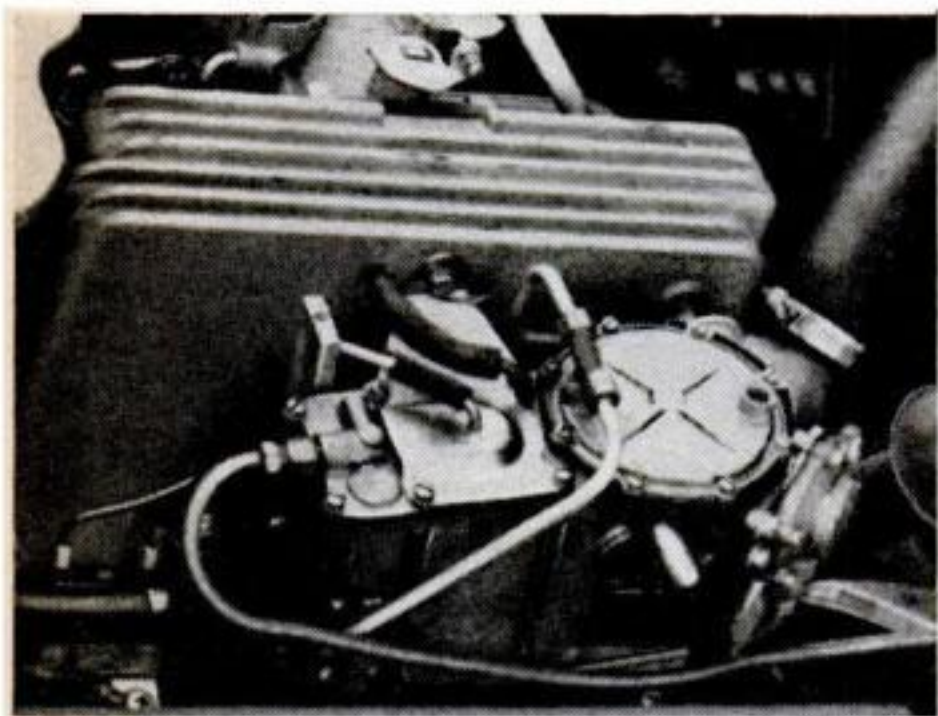
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ANSWERS: 1. *Fuel injection system, for efficient fuel consumption.*
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pen to his customers. I'd like to add to his collection of wacky case histories the tale of the British doctor driving in the middle of the Sahara, with 1,000 miles of dry desert ahead, when his radiator burst.

What would Gus do? Just what the doctor did: Fill the radiator gaps with yellow soap and drive hopefully on. According to the London *Daily Mail*, quoting the doctor: "At first the radiator



bubbled over with soapsuds, but it settled down and carried me safely for another 5,000 miles."

RALPH WESLEY, Minneapolis.

Inboards vs. Outboards

I FEEL that Hank Bowman ["How Good Are the New Inboard-Outboards?" June] has missed the point when he says the operating economy of the inboard and the outboard two-cycle are practically on a par. The figures he quotes are for wide-open-throttle conditions and the gallons-per-hour should be approximately the same. In fact, a good rule of thumb for any engine at wide-open throttle is 1 gal./12 hp./hour.

For those who don't race, but troll at 5-6 m.p.h., the picture is entirely different. Trolling in my 85-hp. Grey marine inboard at 12,000 r.p.m., I use about a gallon an hour. When I trolled in a 30-hp. outboard, I used about three. Outboards are not economical at low speed. Low speed means retarding the spark—a very uneconomical proposition. The outboard engine sucks in a full charge of gasoline and air mixture at all speeds. The four-cycle inboard only sucks in a partial charge of gas with an advanced spark at low speed.

R. A. BARNARD, Nokomis, Fla.

... AS DESIGNER of the Kermath Screwball vertical inboard engine, may I correct your statement that there were "few orders." Because of conditions within the company that prevented tooling and production—and ultimately caused me to

[\[Continued on page 24\]](#)

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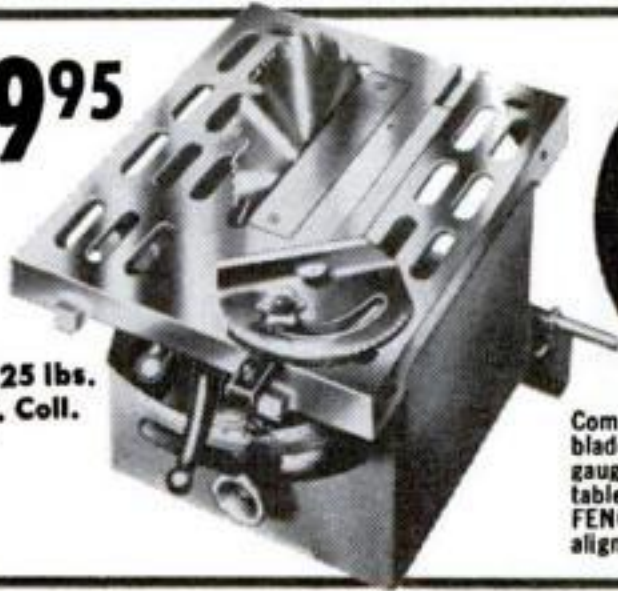
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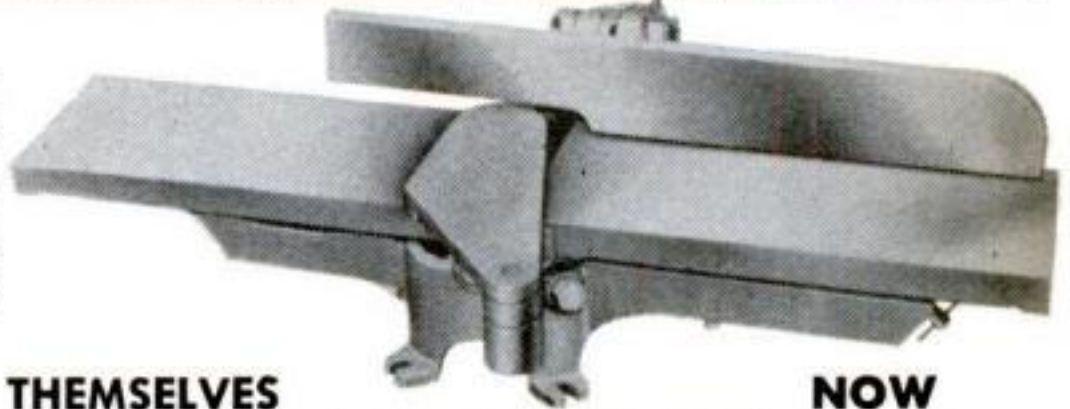
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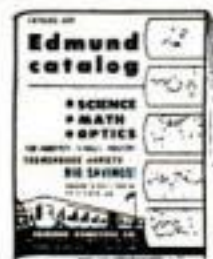
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The month in science

The man-horse from outer space. Since the creepy notion that millions of unknown planets are inhabited by intelligent creatures has now become respectable, scientists are muscling in on the science-fiction writers and predicting what these Space Beings look like. The professors sneer at the blonde hussies and antenna-headed green goblins of the comic-strip space world. Yet the Space Beings they dream up are just as weird. Centaurs, for example. That idea comes from no less an authority than William Howells, professor of anthropology at Harvard. He expects to find extraterrestrial creatures that combine horse bodies with human arms and heads, like the centaurs of the old Greek myths.



Space Being: bimanous quadrupedal hexapod?

And he makes a convincing case in a section of his book "Mankind in the Making" (Doubleday, \$4.95).

Professor Howells reasons that intelligent creatures need to move around—otherwise they can't accomplish anything. So Space Beings must be self-contained, with some kind of bones to hold them up, a nervous system (probably electrical, like ours) to control operations, and a liquid supply system—"we can hardly suppose that nourishment flows through their veins in the form of breakfast cereal." The main center of the nervous system—which has to be big for intelligence—would make a lump like a head.

Space Beings will not be insects, because insects are designed for living by instinct, not by learning and thinking. They will not be birds because birds are stupid, too; flying is so difficult that bird brains must concentrate on muscle coordination. They might live in the water. But land creatures are more likely.

Hands are essential because hands appear to be the only efficient mechanism for doing things. (Doing things is what made humans human.) Hands require arms: just two because three wouldn't balance and four or more would be too difficult to coordinate. Hands also require fingers; five is probably the best number—it can't be coincidence that humans still have the same complement of fingers that the earliest land-living animals started out with millions and millions of years ago.

Now for legs. Earthmen have two—it was either balance on two legs or do without hands. Hands were the wise choice, even though two-legged support has led to chronic backache and other troubles. The human pattern was set way, way back when ancient fishes kept only four of their many fins as they evolved

The month in science continued

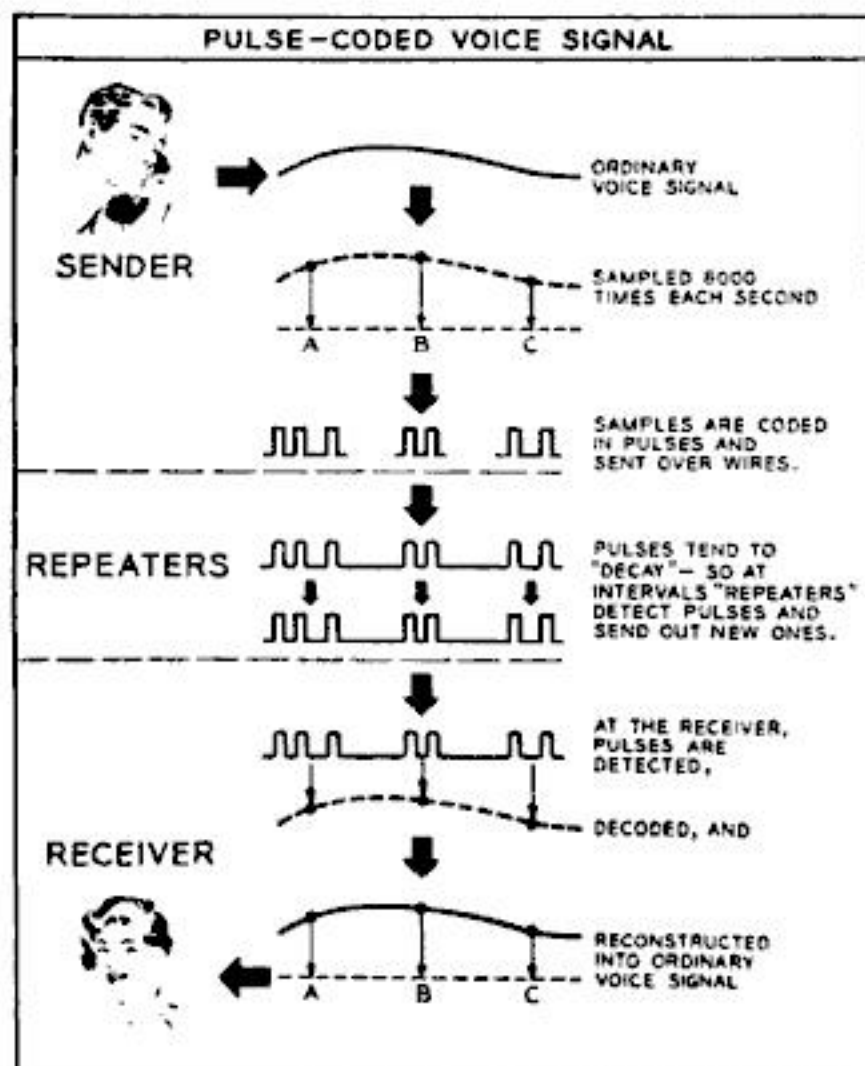
into amphibians. On other planets, evolution could have taken a different turn at this point. Some practical purpose, unknown to us, might have forced early animals to keep an extra pair of limbs. These could eventually become arms and still leave four legs for sturdy support. Says Professor Howells: "I will lay a small bet that the first men from outer space will be neither bipeds nor quadrupeds, but bimanous quadrupedal hexapods."

Talking in code. The Telephone Company is switching over to a modern version of the old Morse code to carry ordinary telephone conversations within city areas. The big advantage: More traffic can be handled without laying more cables.

The new system, called PCM (for pulse-code modulation), is the most radical change in short-distance telephoning since Alexander Graham Bell called Mr. Watson. Until now, the phone transmitter produced an electrical replica of your voice—a current that steadily varied just as your voice did—and sent this replica over the wire to the other end, where the receiver

converted the electrical replica back into sound. With PCM the transmitter and receiver work as before. In between, things are completely different. The current from the transmitter—that steadily varying electrical replica of your voice—is chopped up. Every $1/8,000$ second, a sample is sliced from it. Not even the slice is sent over the wires. Instead, its electrical strength is automatically measured. Only this measurement is sent over the wires—in code, a short string of pulses. At the other end, circuits remake each sample slice from its code prescription. The newly made slices run together to recreate the electrical voice signal for the telephone receiver.

PCM is an old scheme [PS April '48], but has not been used here



before for telephone service. What makes it economically attractive now is the development of small, simple transistor repeaters that can handle 1,500,000 pulses per second. That many pulses can represent samples from a great many different conversations; a lot of people can talk over the same wire at the same time. The repeaters are needed because the pulses "decay"—weaken and become unrecognizable—after traveling more than about a mile. These are true repeaters (like the old telegraph repeaters) and not amplifiers (like the usual telephone amplifiers)—they simply send out a brand-new, freshly minted pulse every time an old worn-out one comes in.

This story actually happened. The man's name has been changed and this is not his photograph, but the facts are true.

"Your name is on the list"



Doug Mott was not surprised. The recession was on and the assembly line where he worked was almost at a standstill.

And then, strangely, the boss began to smile. "You know how the Engineering Department sends us blueprints and then we have to send them back for revision because they just aren't practical to produce?" Doug nodded . . . wondering. "That's waste . . . and we can't allow it to continue. That's why we thought that if we had a man who knew assembly and production — and drafting, too — he could act as liaison man between engineering and production. You know production, Doug . . . and you're studying drafting with I.C.S. You've got a *new job*. Congratulations!"

Doug Mott now heads a drafting room. But he will never forget the day his name was on the list to be laid off.

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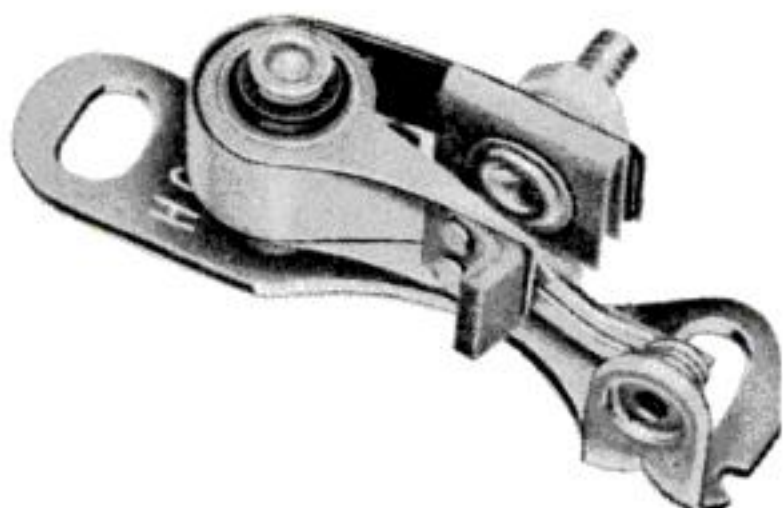
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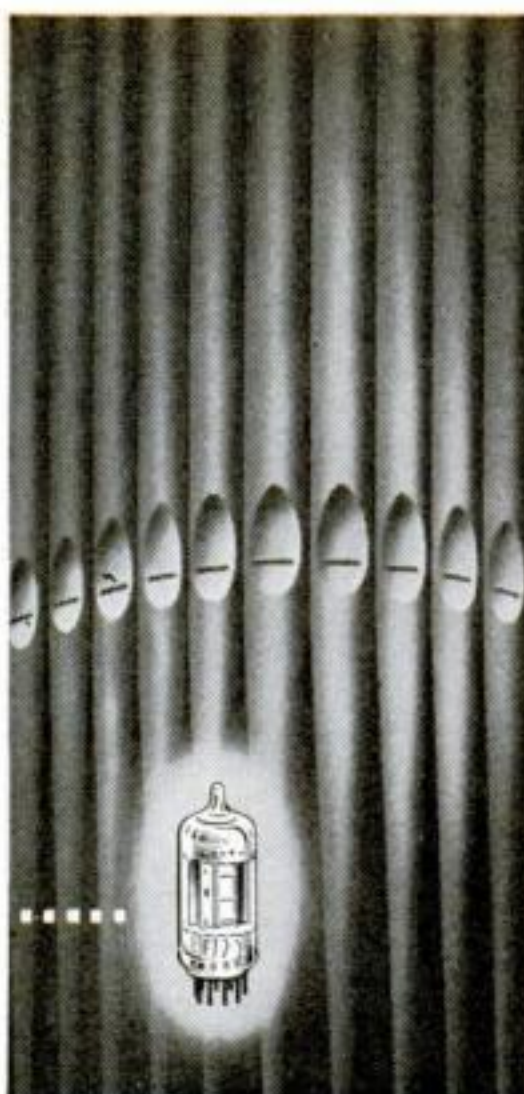
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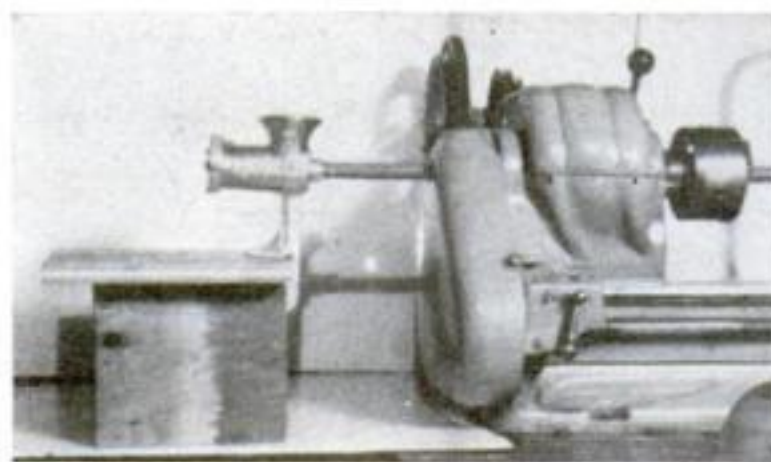
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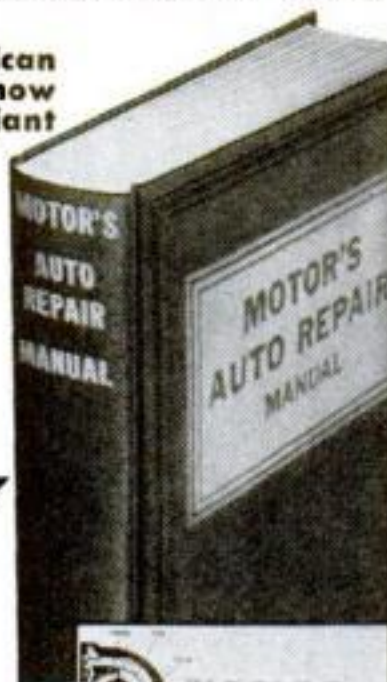
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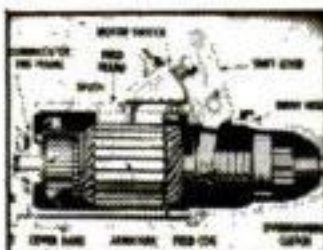
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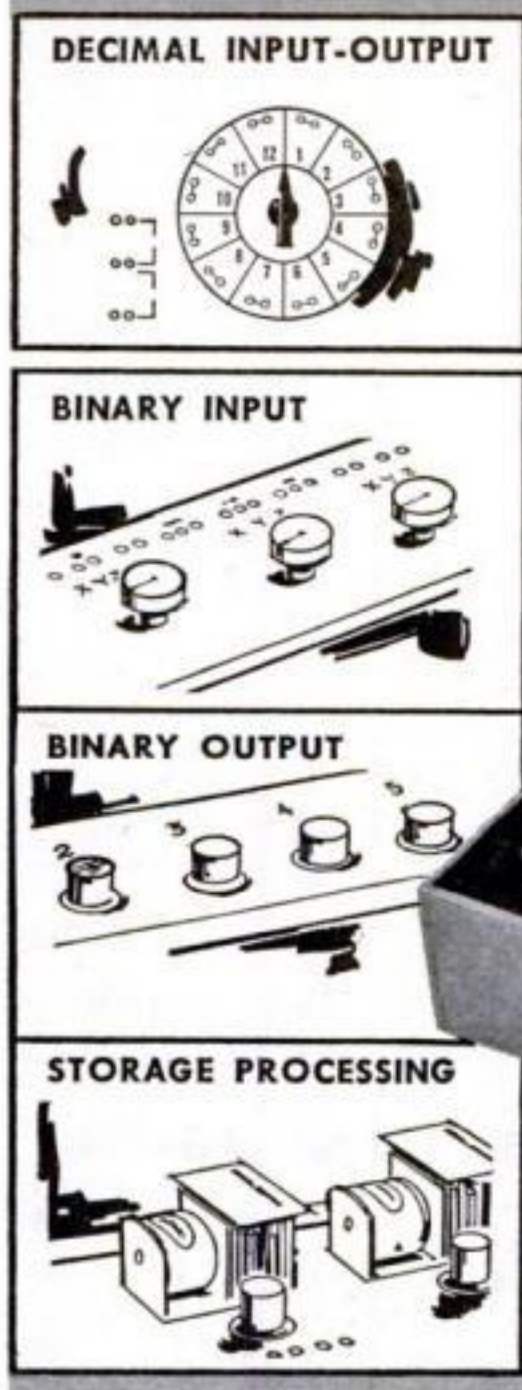
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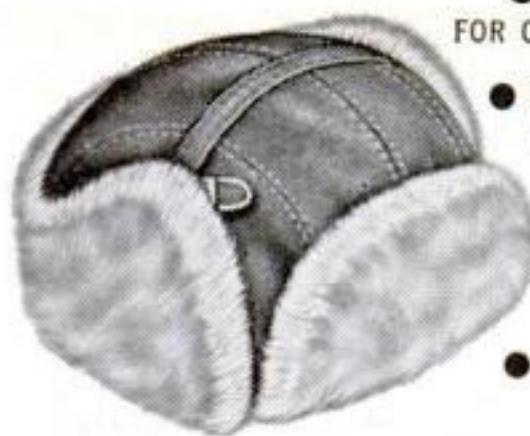
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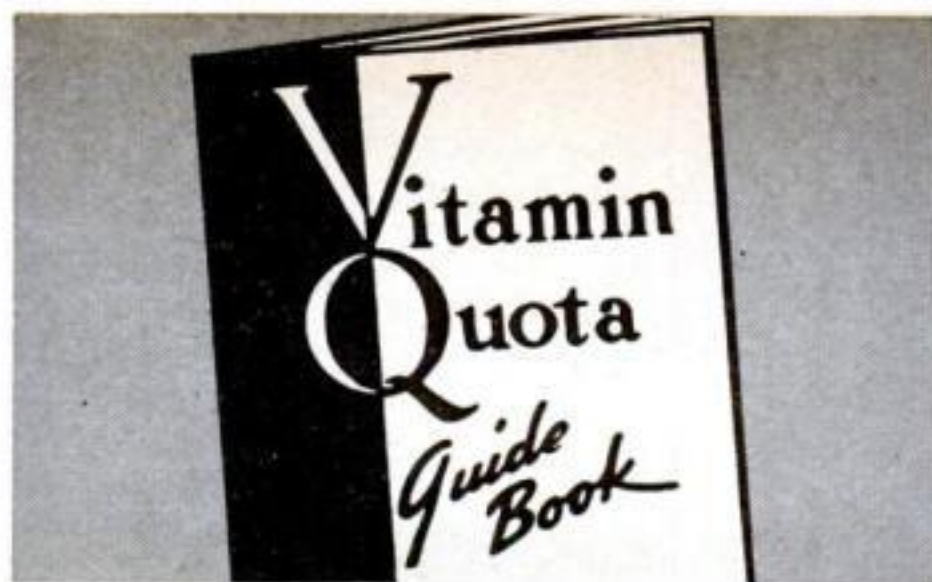
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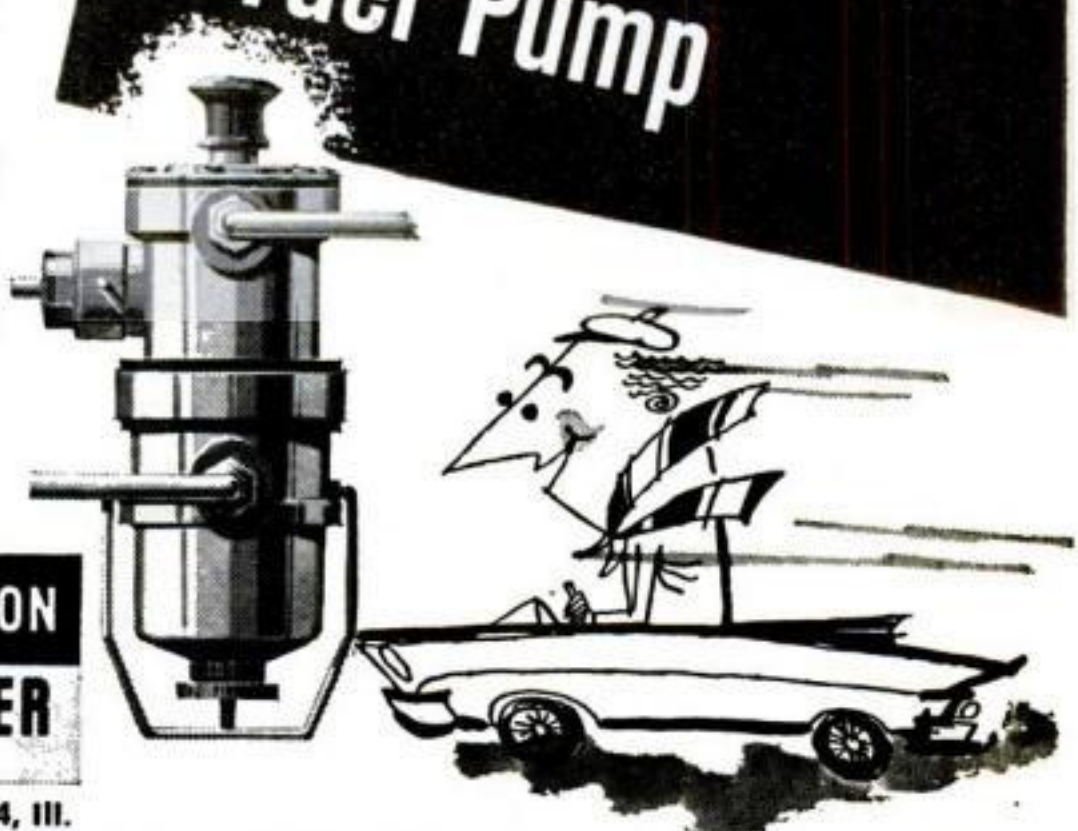
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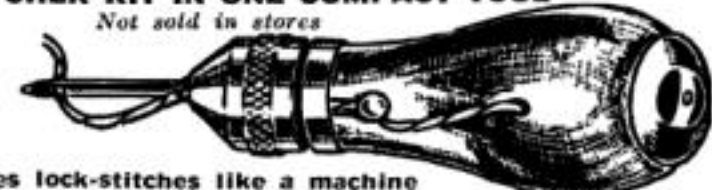
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Name _____ Address _____
City _____ State _____
Occupation _____ No. of Cars in Family _____
Make of Car _____ Model _____ Year _____ No. of cy's _____

I have had my driver's license _____ years.

I have taken a driver training course. ☐ Yes ☐ No

Car Is Used for:

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Pleasure ☐

To and from work

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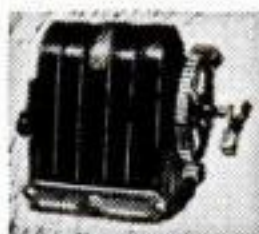
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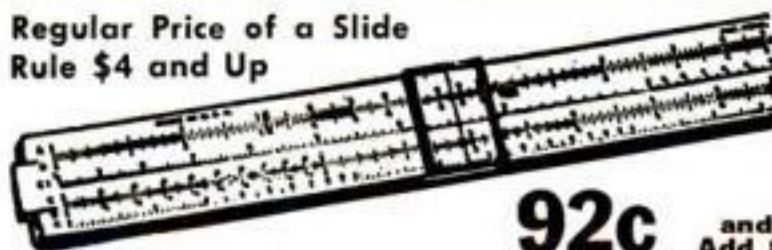
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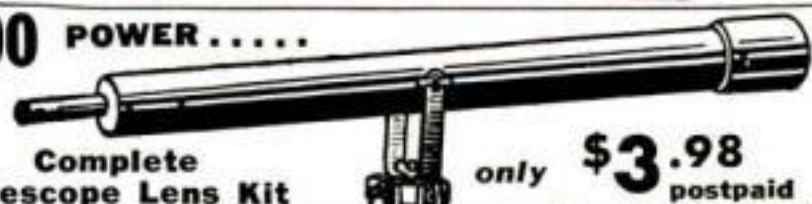
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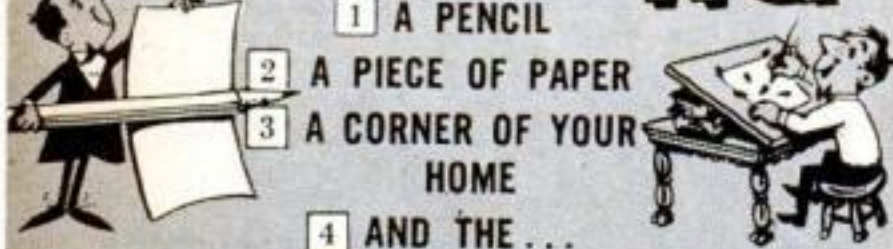
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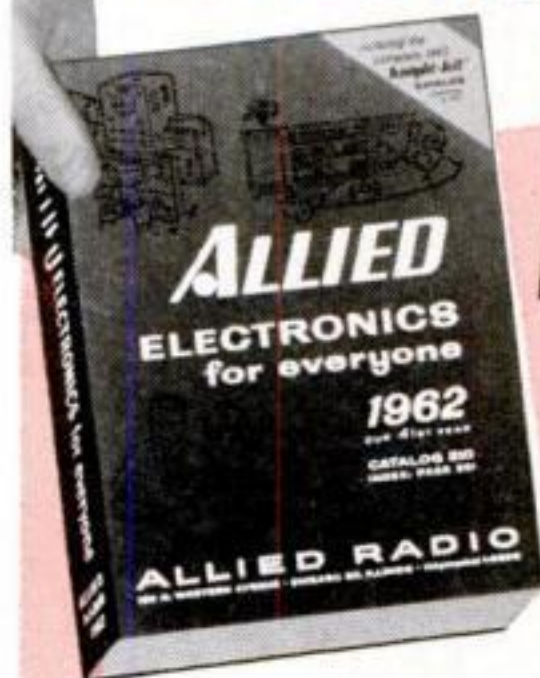
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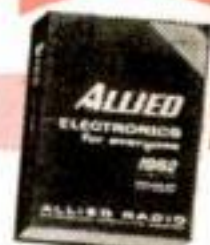
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DETROIT REPORT

By Devon Francis

End of the Smog Makers?

TWO years from now, and perhaps even sooner, it seems certain that every auto turned out by Detroit will have a device in its power-plant innards to reduce by a third the foul unburned gases blown out into the air. Abraham A. Ribicoff, U.S. Secretary of Health, Education, and Welfare, has said as much.

Unless auto manufacturers install a means of reducing air pollution, Ribicoff warned them, he will ask Congress for a law to make them do it. The earliest this could go into effect—by law—would be about this time in 1963 for cars of the 1964 model year. But a voluntary push by the industry could cut the time in half. Right now, every new car delivered in California already conforms to the Ribicoff edict—but by California, not Federal, law.

How much would the gizmo cost the purchaser of a new car? Around five dollars—and perhaps less.

Despite advances in engine engineer-

ing, modern gasoline engines still have a long way to go. Like a kerosene lamp that uses only part of the energy potential of its fuel—that flame the wick throws up is yellow because hydrocarbons in the fuel remain unburned—the cylinder heads of a gasoline engine also waste hydrocarbons. Only a fourth of the energy in the fuel is actually consumed when the spark ignites it. The unburned part goes two ways: some out the tail pipe, some into the crankcase.

As yet, little has been done about the emissions from the tail pipe. But the unburned hydrocarbons in the crankcase—deposited there by “blow-by” past the pistons—are, in part, controllable. The crankcase has a breather tube to vent the foul gases into the air.

The simplest way to cope with crankcase gases is to pipe them back into the cylinders for another go-round. It's like feeding the unburned gases of the kerosene lamp back into the fuel bowl. That is what is being done by the antipollution devices with which cars in smog-plagued California are fitted. The most popular device is made by GM's AC Spark Plug division.

Meantime, attacks are also being made on the emissions from tail pipes. After more than two years of research, W. R. Grace & Co. has produced a catalyst to be put in mufflers. It is said to render a lot of noxious fumes harmless.

.....

Supersecret: The XP 715. Despite denials by Buick that it will bring out a Thunderbird-type sporty (not sports) car during the 1962 model year, work is being pushed on the project. Code name for the car is XP 715. It has a fiber-glass body, though there's no assurance that it will be made that way on the production line.

An interesting feature of the car is that its wheels, unlike those on almost all GM cars up to '62, will have tapered roller bearings rather than ball bearings. Tapered bearings—now standard on Olds and Pontiacs—adjust more readily to the torque put on the outside nut on the axle by the production worker or your garage mechanic.

.....

The cupcake body. Speaking of fiber-glass, it's entirely possible that some auto makers will adopt an idea propounded more than 20 years ago by the late Bill Stout, designer of the Ford trimotor airplane.

Stout argued endlessly but to no avail at Ford for dentproof car bodies made of plastic reinforced by fiber-glass. His

views were justified when Kaiser, and later Corvette, produced just such bodies.

Creative Industries, of Detroit, recently built a compact-size car with only 11 plastic body panels compared with the more than 90 used in the Corvette. Such bodies are turned out in forms, like cupcakes.

Other ideas are brewing, such as use

!NEWS!

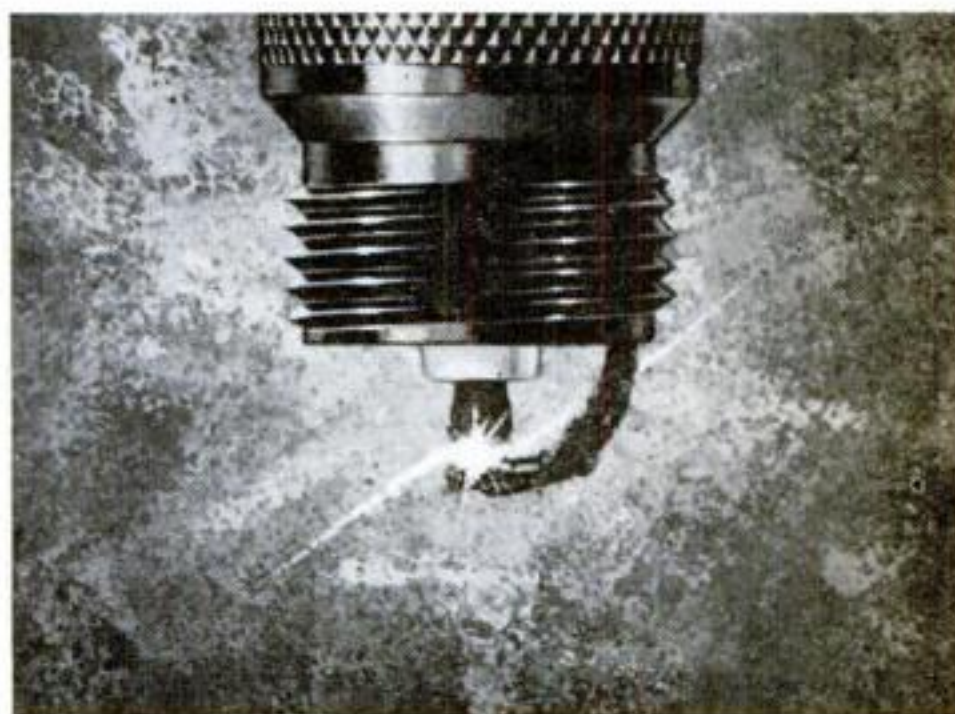
FORD MOTOR COMPANY SWITCHES TO AUTOLITE

Autolite Spark Plugs are now specified for original equipment installation on every vehicle that rolls off Ford Motor Company assembly lines. And they are strongly recommended by Ford Motor Company engineers for replacement use in all units now in service. Why does Ford Motor Company, like so many other manufacturers, specify Autolite? One of the main reasons is the way Autolite Power Tip actually cleans itself while you drive. See pictures below.



In each Autolite Power Tip spark plug the electrode or firing tip is longer than usual. This tip is made of a special heat resistant alloy. Now, watch what happens.

But the firing tip on an Autolite Power Tip spark plug extends deeper into your engine. Deposits are immersed in the searing heat of the exploding gasoline.



As you drive, lead and other harmful, fouling deposits start to accumulate on the firing tip. If allowed to remain, they will eventually short out and kill the plug.

With a Power Tip, each time your engine fires, the deposits are actually burned away. Your spark plugs stay clean, so that your mileage and power stay at their peak.



AUTOLITE SPARK PLUGS
Clean themselves while you drive

DETROIT REPORT continued

of reinforced plastics—following the lead of Chrysler in this field—for parts of car bodies. Experiments are in progress for molding one panel for the car-trunk floor, spare-tire well, and gas tank. Another thought: Cloth trim could be attached

to plastic car doors while they were being fabricated. Why not attach a rug to the entire floor pan in the manufacturing?

There's a catch, of course, to all of this—steel bodies cost less when the production run exceeds 50,000 cars.

Updated Volkswagen. A lot of changes have gone into the '62 Volkswagen announced last month. The gasoline gauge on sedans—a running change on the production line for '61—has been added to Karmann Ghia coupes, station wagons, and trucks. The reserve tank-control cock is, in consequence, gone. Most VW owners won't miss it.

Other alterations include: larger tail and brake lights; a special switch that blinks all four turn signals continuously on trucks and wagons in emergency; safety-belt anchorages (for over-the-shoulder belts); improved heater outlets; a windshield washer; a front hood spring; a softer brake pedal; and some permanently lubed points, such as tie-rod joints.

Wrong forecast: rain. Tinted windshields always make a light-gray sky look as though a storm is brewing. A

chemical company may have the answer—a substance in the glass that tints up only in bright sunlight.

Those bloody tail lights. Something else is cooking, and it will be served up before not too long. That's a system for increasing the intensity of rear turn and stop signals in daytime. Now, in bright sunlight, they're often too dim to be seen.

But make 'em brighter and you create another problem. At night, they'd dazzle the driver behind you. The answer: resistors to cut intensity of the tail lights when headlights are switched on. (A British company is coming out with the same system, too.)

Superchargers for '64. With most of the 1962 cars in the showrooms, what's Detroit got up its sleeve for the future? Here's a long-range peek at the drawing boards.

For 1964—and possibly even earlier—look for a development that will snatch the hat right off your head. It's a medium-size car with the around-town gas economy of a Volkswagen and the open-road performance of one with 200 horses under the hood.

The secret: a "blown"—that is, supercharged—engine.

The idea is being pushed hard at both Oldsmobile and Chevrolet. Small and rugged, the power plant would use a good portion of the 40 percent of energy potential that goes out the exhaust pipe of today's typical car engine.

The objective is to triple or even quadruple the horsepower produced by an engine of a given piston displacement. The supercharger would, of course, have to be something special. Those now available boost power by only half again, or less.

A unique feature of this arrangement could be a switch that would permit the driver to turn the supercharger on and off. Why use all the machinery for added power in simple city driving? It goes without saying that the engine would have to be built to withstand the extra stresses and heat generated by higher compression ratios. Shape of things to come may be embodied in the design of the four- and six-cylinder engines for the new Chevy II (see page 68 for story and pictures).



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PS Puzzlers By Joan Steen

October's harvest to harry you . . . Answers on page 205



Dinner-Table Tricks

IF YOU plan to baffle your friends with neat puzzles that need props, I say make the materials neat, cheap, and easy to get ahold of. That's why I like these two pint-size puzzles. Kenneth Swezey likes them, too. You'll find them in his *After-Dinner Science*. Both use materials

you can find on the dinner table:

1) Can you remove an ice cube floating in a cup or glass of water with the help of a short piece of string? (Plus anything else handy on the table.) No, you can't truss it up or spoon it out.

2) Can you balance a cup, some napkins, and two dinner knives on the tip of your index finger?



HERE's a juicy problem. At the Harvest Fair, Mr. Jones left his two boys in charge of the apple stand, telling them they could keep whatever they made. Pete was to sell the larger apples at two for a penny. George was to sell small ones at three for a penny. Both had the same number of apples.

George, being a wily sort, turned to Pete and said, "Look, there's no use both of us wasting the afternoon. You go and I'll dump all the apples together and sell them all at five for two cents—that's the average. And later we'll split the profit."

Pete, a lazy type, agreed. It wasn't until the end of the day, after all the apples had been sold, that Pete realized he'd been had. Not only was the total taken in seven cents less than it should have been, but when it came to divvying up the profits, Pete took an even greater loss. Can you figure how much?

THE rules are simple for this Martian puzzle of Sam Loyd's. Starting at the South Pole (T), trace your way through all the canals and cities and see if you can spell out a complete English sentence using each letter only once, and ending up at the starting point.

You might be amused to know that Loyd says that when the puzzle first appeared more than 50,000 readers wrote in to report, "There is no possible way." And yet Sam says it's easy.



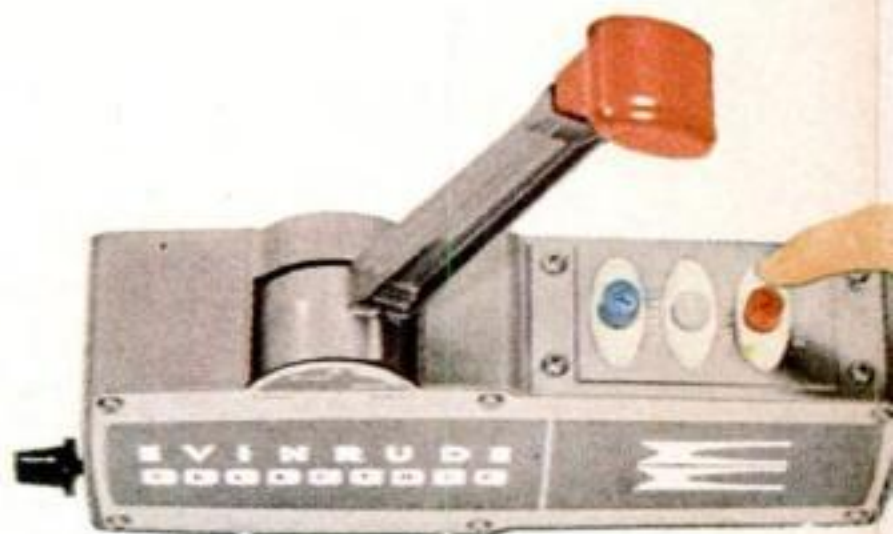


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Try the greatest advance in outboard boating control since the driver moved up front! Simply push a button to go forward . . . shift to neutral . . . or reverse. Evinrude's new Selectric Shift gives you instant control, electrically, in every maneuvering situation. This exclusive feature sets the pace for progress in the entire 1962 Evinrude line. There are ten models . . . in 3, 5½, 10, 18, 28, 40 and 75 hp sizes . . . with engineering refinements like automatic choke . . . fool-proof, fixed-jet carburetion . . . thermostat-controlled cooling . . . quiet, cushioned, sound-sealed power. Even electric power motor tilting is available on the 75 hp V-4 Starlite IV! ■ There's a new 40 hp Lark IV, with Selectric Shift and new high-efficiency lower unit. There's a brand new 28 hp model with the emphasis on value — a dollar-for-dollar "best buy" if there ever was one. ■ For the world's most versatile pleasure power — see your Evinrude dealer. He's listed in the Yellow Pages under "Outboard Motors." Bring along your finger and try new push-button boating! ■ Free 1962 catalog! At your dealer's or write Evinrude Motors, 4172 North 27th Street, Milwaukee 16, Wisconsin.

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WORLD'S MOST VERSATILE PLEASURE POWER!



EVINRUDE

PS Puzzlers continued



SURELY the shortest, most concise, of all logical puzzles is this one:

A says, "B lies."

B says, "C lies."

C says, "A and B both lie."

Is there anyone who's telling the truth?

A PAIR of odd puzzles for you: One's an odd calculation, the other's a calculated odds.

1) How many pairs of numbers are there that both add and multiply to the same amount? (Include fractions.)

2) In a scheduled three-horse race, the odds against Sport are two to one, the odds against Favorite Son are three to two. What should be the odds against Blackie (if races were run by the rules of probability)?

Puzzle of the month



YOU'RE marooned on a desert island and it becomes vitally important to bisect a line segment. But when the ship sank, all you rescued was a compass (the kind you make circles with). You have no ruler. Can you still bisect the segment? (Unlike trisecting an angle or squaring a circle which are impossible even with a ruler and compass, it is possible to bisect a line segment with a compass alone.) There is a straightforward solution that you can prove. There is also an alternate way that leads to a fascinating branch of geometry. (Answer next month.)

Answer to last month's P.O.T.M: Two ladders, a 20-foot and a 30-foot one, stretch in opposite directions between two walls. They cross at a point 8 feet above the ground. What is the width of ground between the walls?

When I looked at the diagram, I winced at all the similar triangles and decided that that way meant grief. So I used a graphical approach—not exactly cheating, but not Simon-pure and elegant either.

Using a sheet of graph paper on which I'd ruled a base line, I laid out a circular arc 30 units long. Then, using the compass as dividers, I measured a 20-unit length from appropriate base-line points and determined the crossing points. The

one that gave the closest to an 8-units-high reading corresponded to a base width of 16.2+ units. That was enough for me.

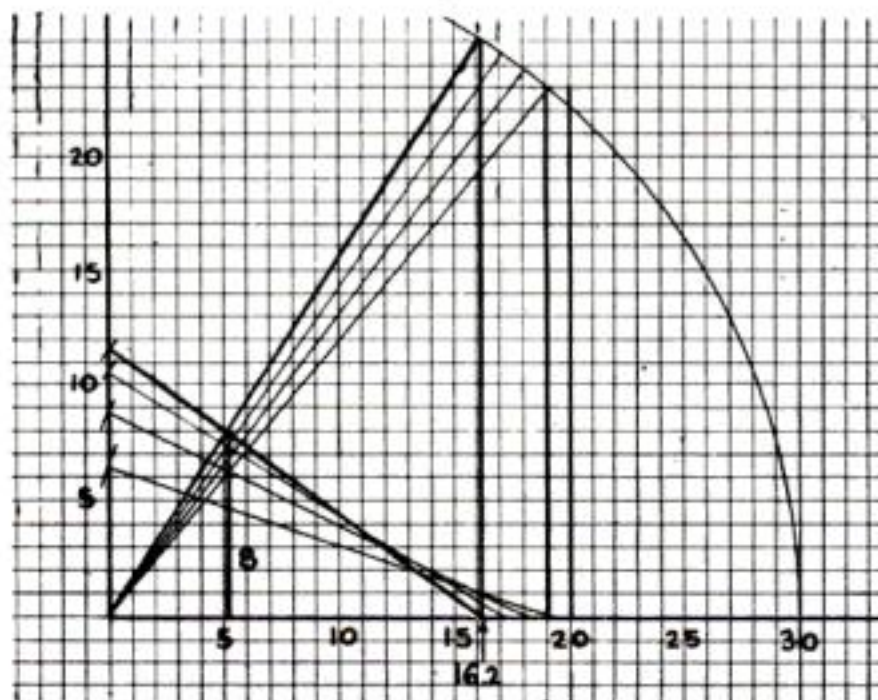
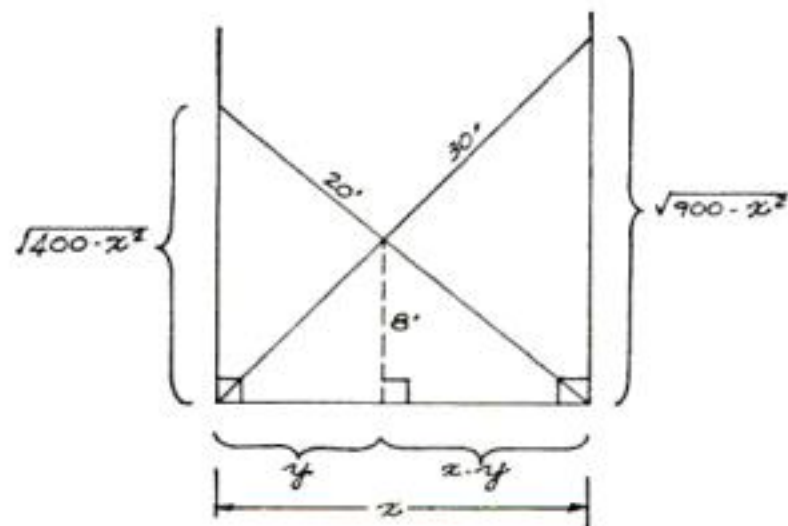
You can check this against the cumbersome algebraic equation that arises from the similar triangle approach:

$$\frac{8}{y} = \frac{\sqrt{900 - x^2}}{x}, \quad \frac{x - y}{8} = \frac{x}{\sqrt{400 - x^2}}$$

Solving each of these equations for y and then setting them equal to each other yields:

$$\frac{8}{\sqrt{900 - x^2}} = 1 - \frac{8}{\sqrt{400 - x^2}}$$

This, in the language of mathematicians, is very messy indeed.



WEN

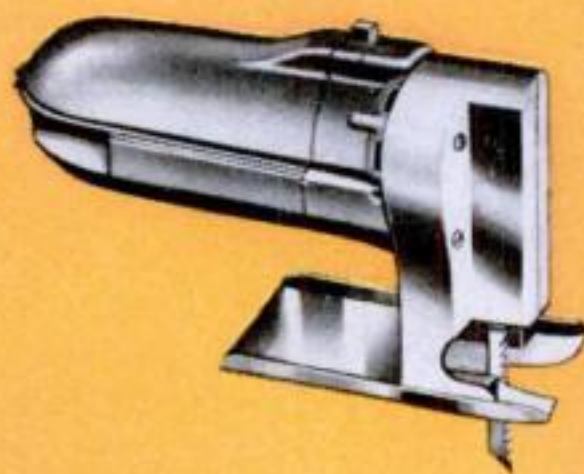
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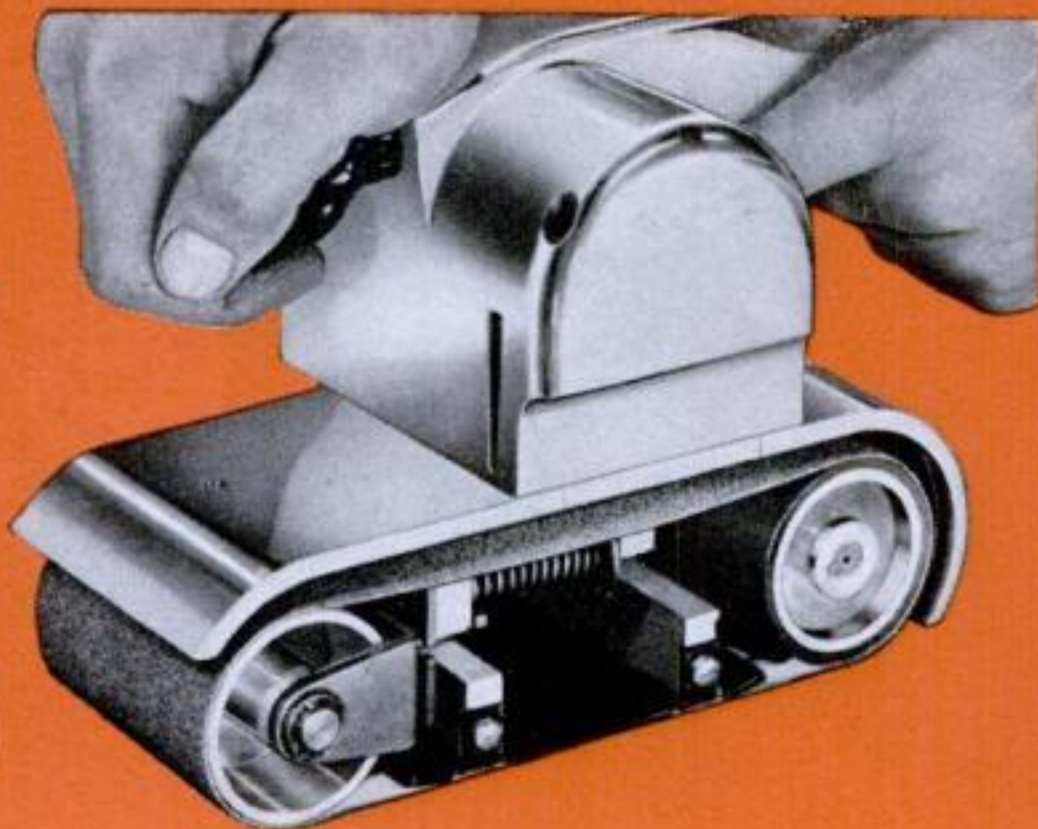


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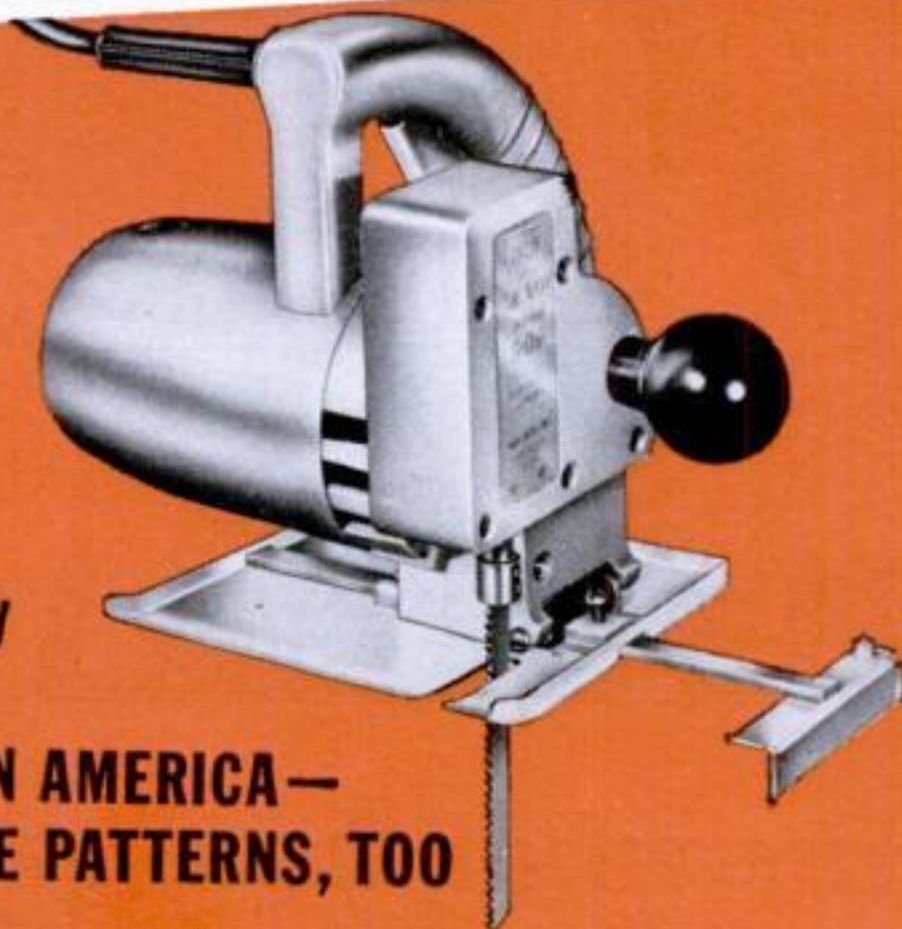


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cigarettes used to
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Change to Luckies and get some taste for a change

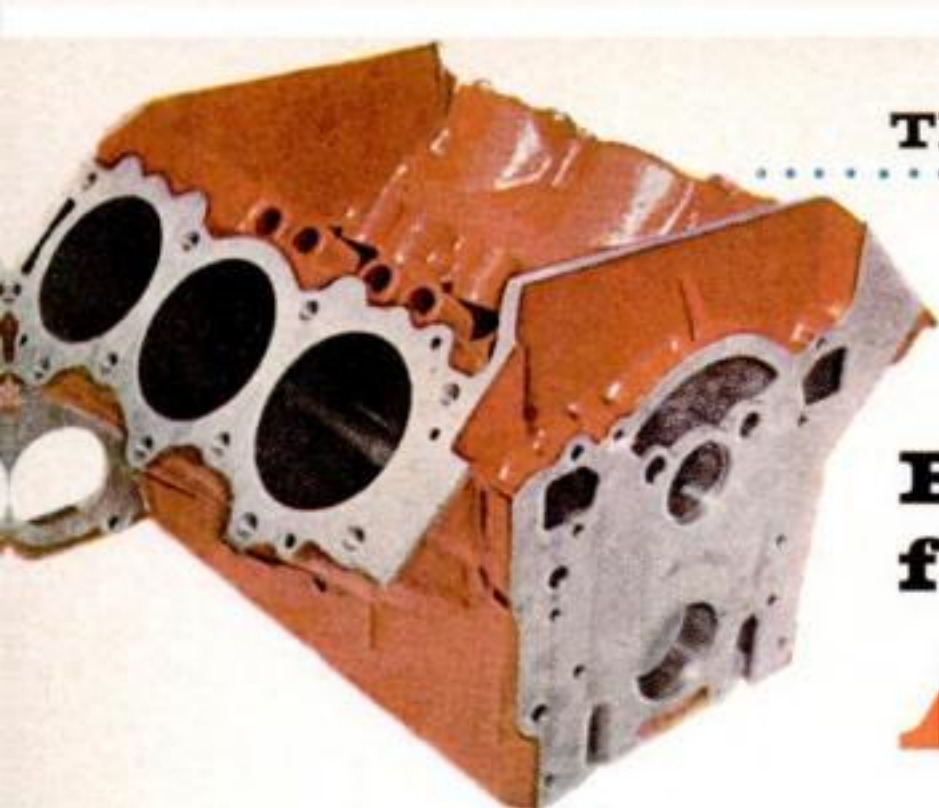


The '62 Cars Inside and Out

YOU have to look close for styling changes in the 1962 crop from Detroit, but under the hoods—*wow!* It's a big year in the engineering department. There are three new-from-the-block-up engines (including such surprises as a four and a V-6), expense-saving refinements in cooling and lube systems, and a brand-new brand: the middle-size compact Chevy II.

Here's the full report in 30 pages
of facts and photos

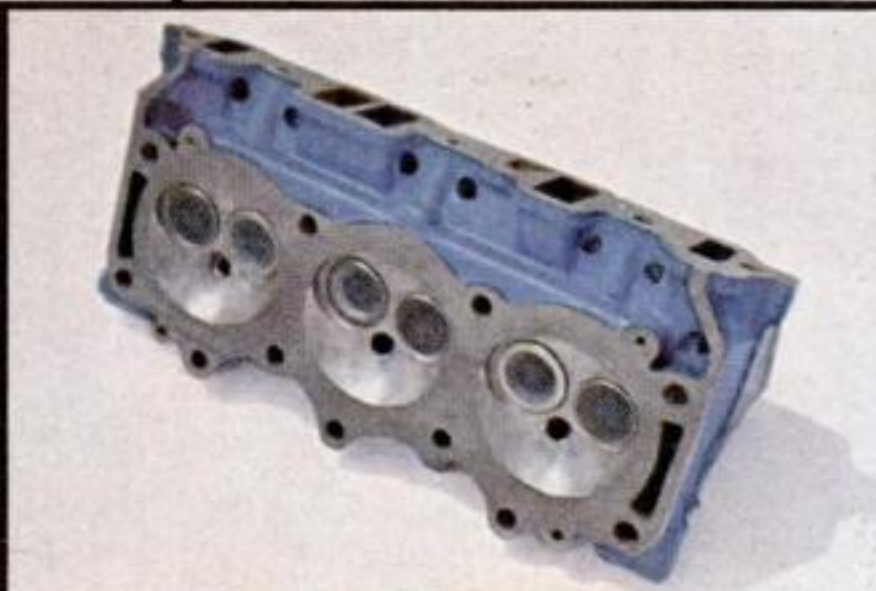
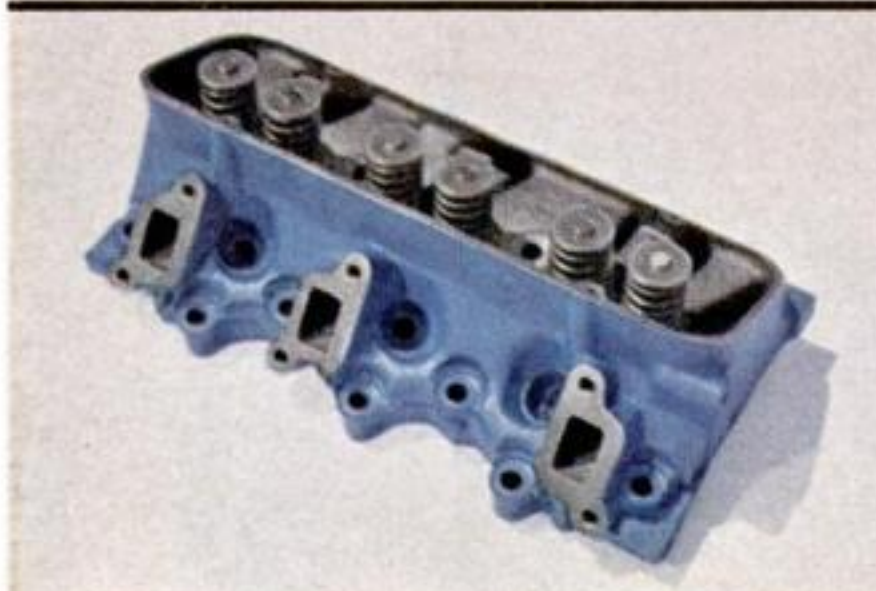
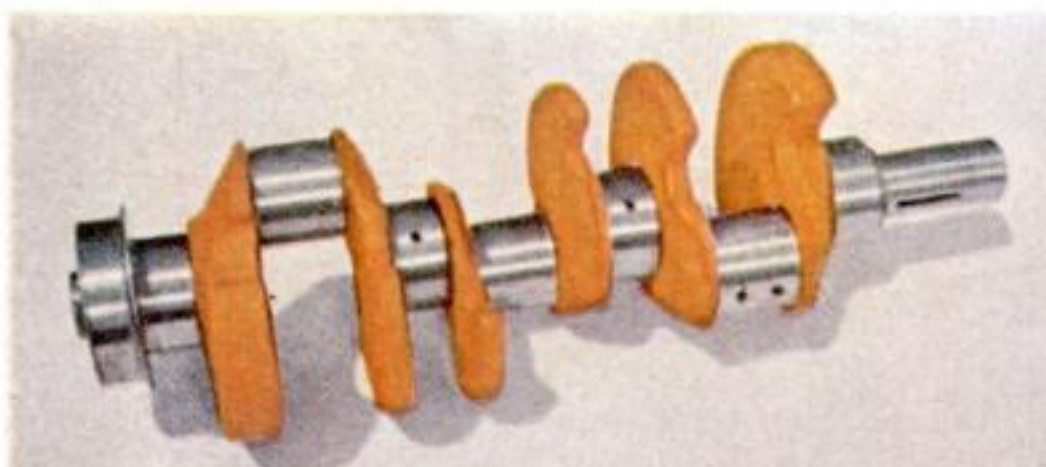
It's a V-6—first engine of this type ever to power a U.S. passenger car—for the Buick Special	66
Chevy II, sized between Corvair and Chevrolet, comes in with a four-banger (there's a six, too)	68
Details make the styling news. You see the 1962 look in full-color close-ups of 20 makes	70
A light that shines around corners? A real emergency brake? Here are the gimmicks for '62	72
Tricky engineering makes radical engines that give superhighway power while saving weight and fuel	74
The new Ford goes two years between water stops. Are cars that never need service on the way?	78
A POPULAR SCIENCE driver gives the V-6 engine a real workout—across the West and up Pikes Peak	82
What's it like to drive the '62s? Here's the lowdown, in a report from the driver's seat	85
The automobile manufacturers answer back on safety design: Why we <i>do</i> make cars safe	89



The '62 Cars Inside and Out

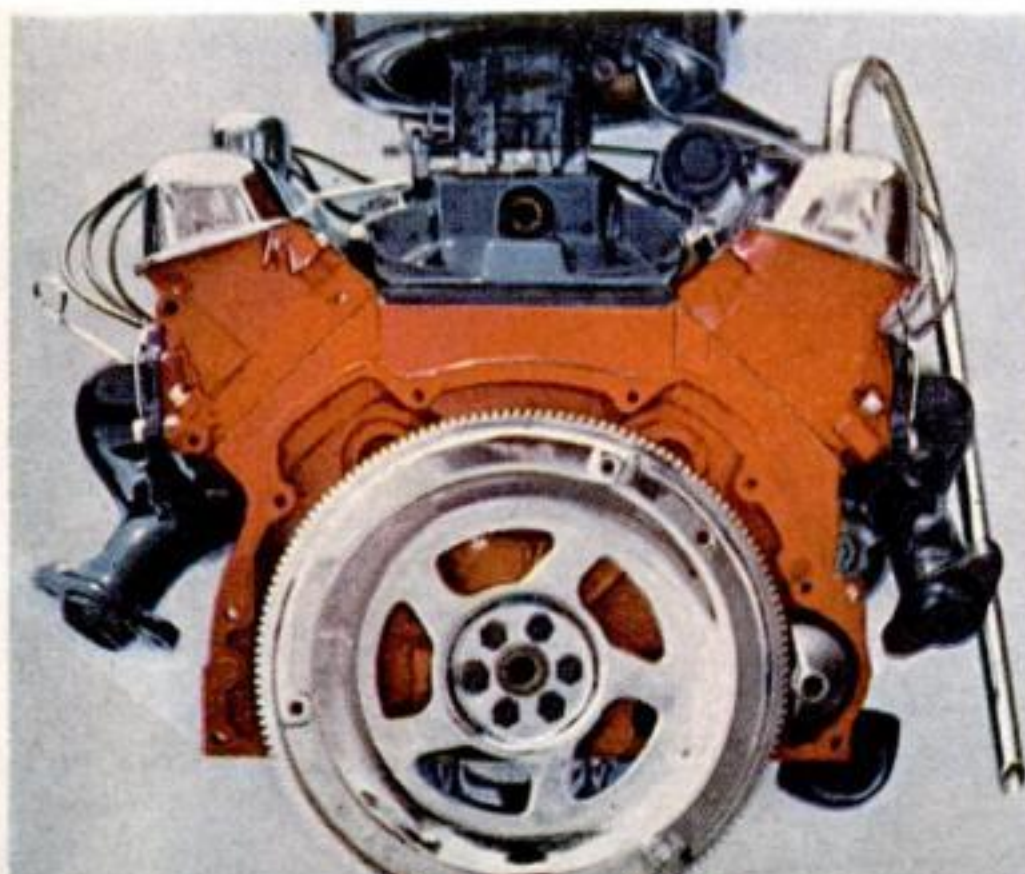
Brand-New Engine for Buick:

A Cast-Iron



DETROIT'S STRANGEST SIGHT FOR '62 is an engine block with three cylinder holes per bank (top of page). V-6 block is only 16 in. long, 12 in. wide, 17 in. high. Photos just above show

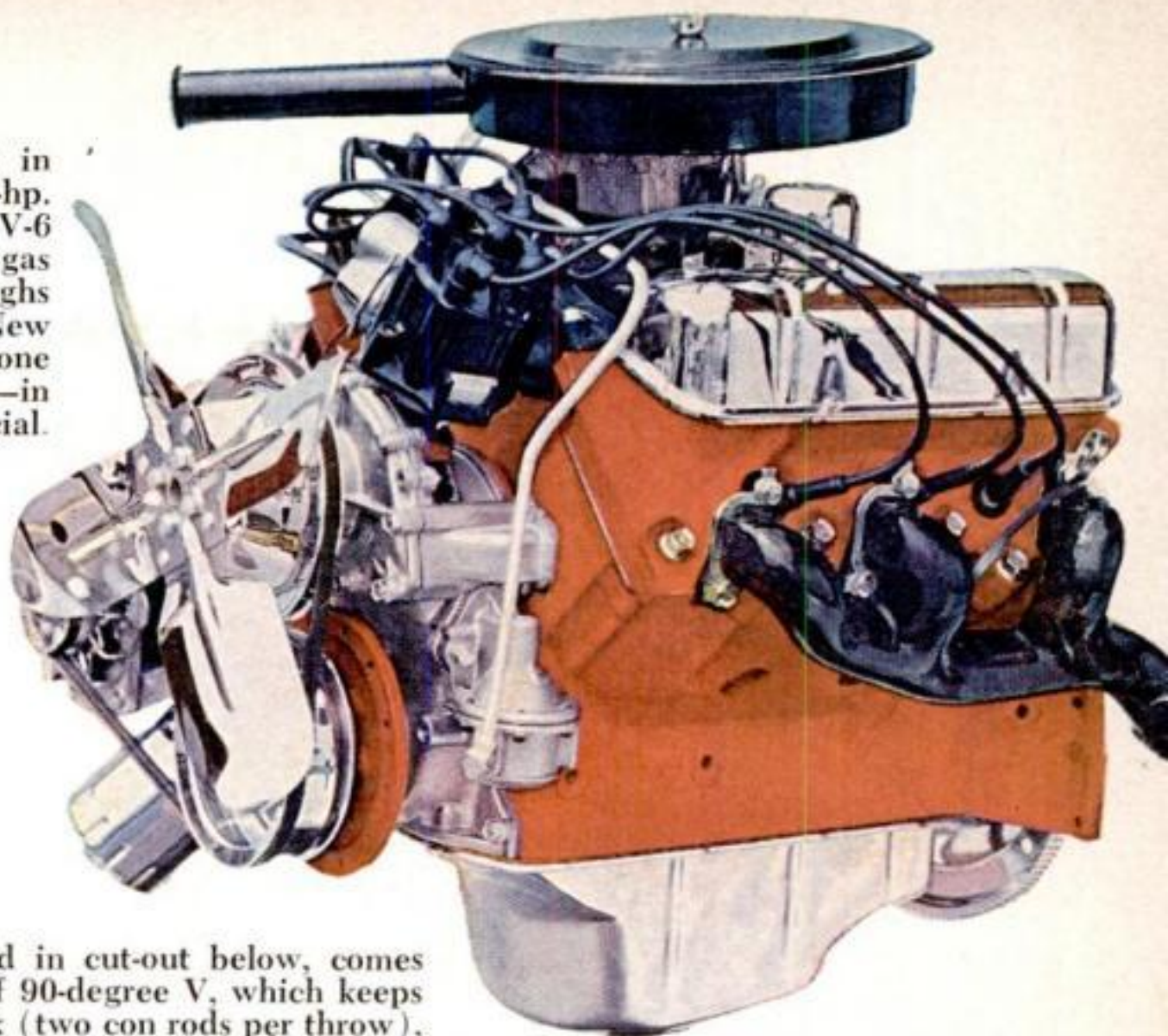
18 $\frac{3}{4}$ -in.-long crankshaft, which has four bearings (V-8 has five); three of six pistons; top of head with its exhaust porting; slanted-saucer design used for the combustion chambers.



FLYWHEEL in automatic-transmission version is a lightweight five-pounder only because transmission behind it smooths out the uneven power pulses. With manual shift, same engine requires 35 pounds of flywheel to compensate for irregular firing. (For comparison, the aluminum V-8, which fires regularly, spins a 21-lb. flywheel.) Only other V-6 engine produced in the U.S. powers some GM trucks; it has 60 degrees between banks and a six-throw crankshaft.

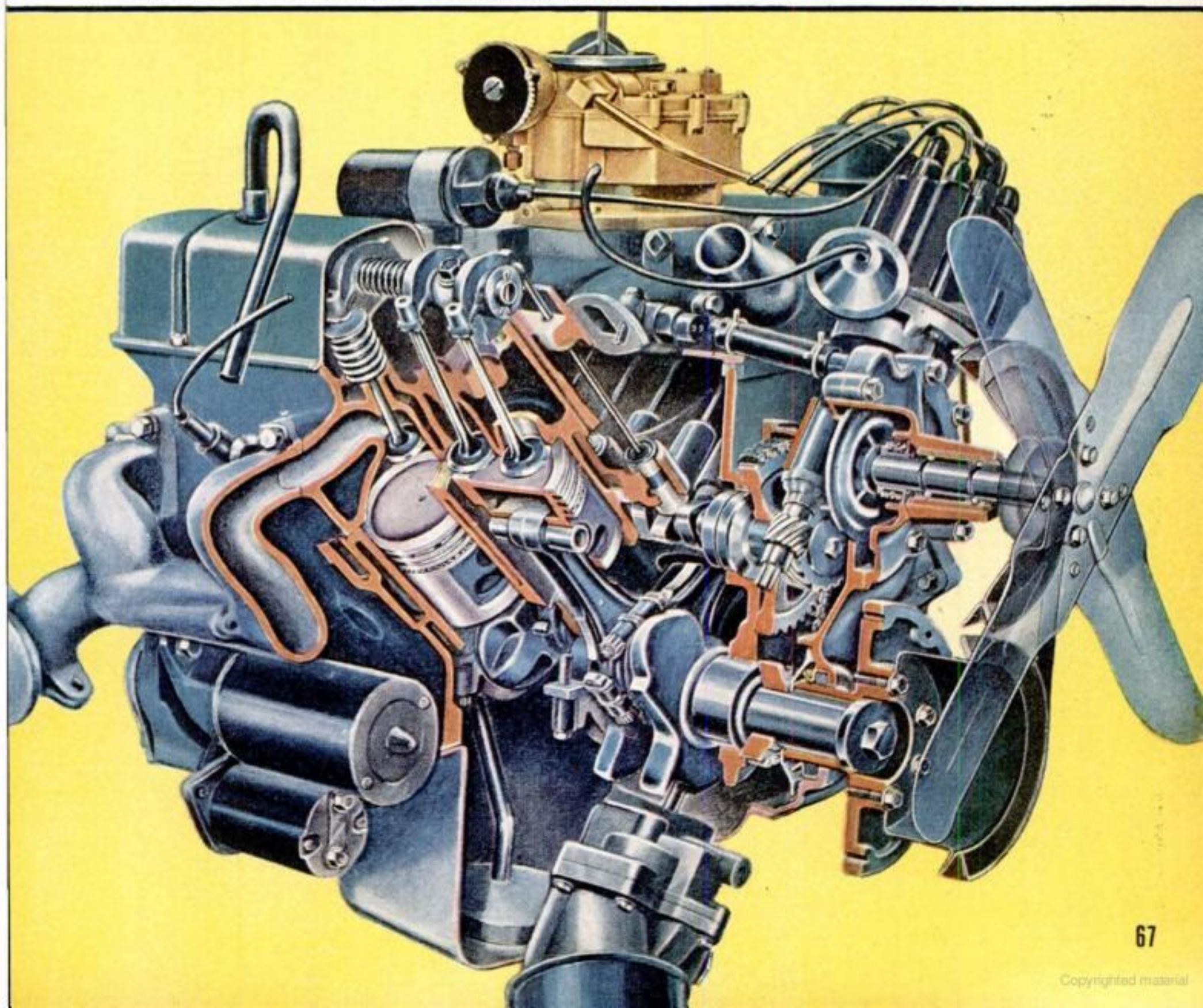
135-HP. V-6 IS STANDARD in '62 Buick Special, with 155-hp. aluminum V-8 optional. V-6 will deliver slightly better gas mileage than V-8. It weighs around 50 pounds more. New engine was produced in one year—half the usual time—in push to cut basic cost of Special.

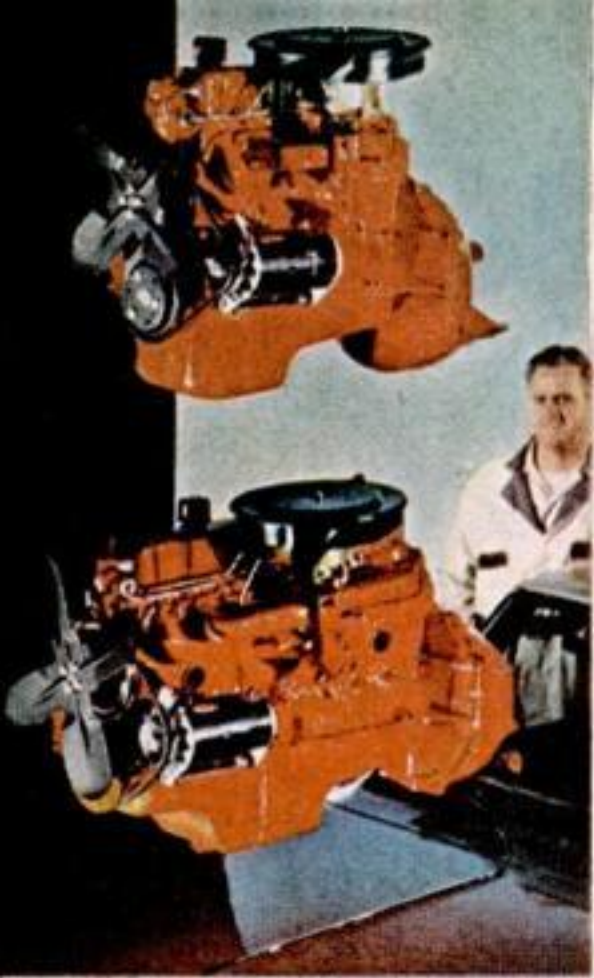
V-6



COMPACT DESIGN, illustrated in cut-out below, comes from unusual combination of 90-degree V, which keeps it low, and three-throw crank (two con rods per throw), which keeps it short. Engine displaces 198 cu. in., only 17 cu. in. less than aluminum V-8. Bore is 3.625 in., stroke is 3.2 in. Aluminum V-8's: 3.5 by 2.8 in.

For more on Buick's V-6, see p. 74





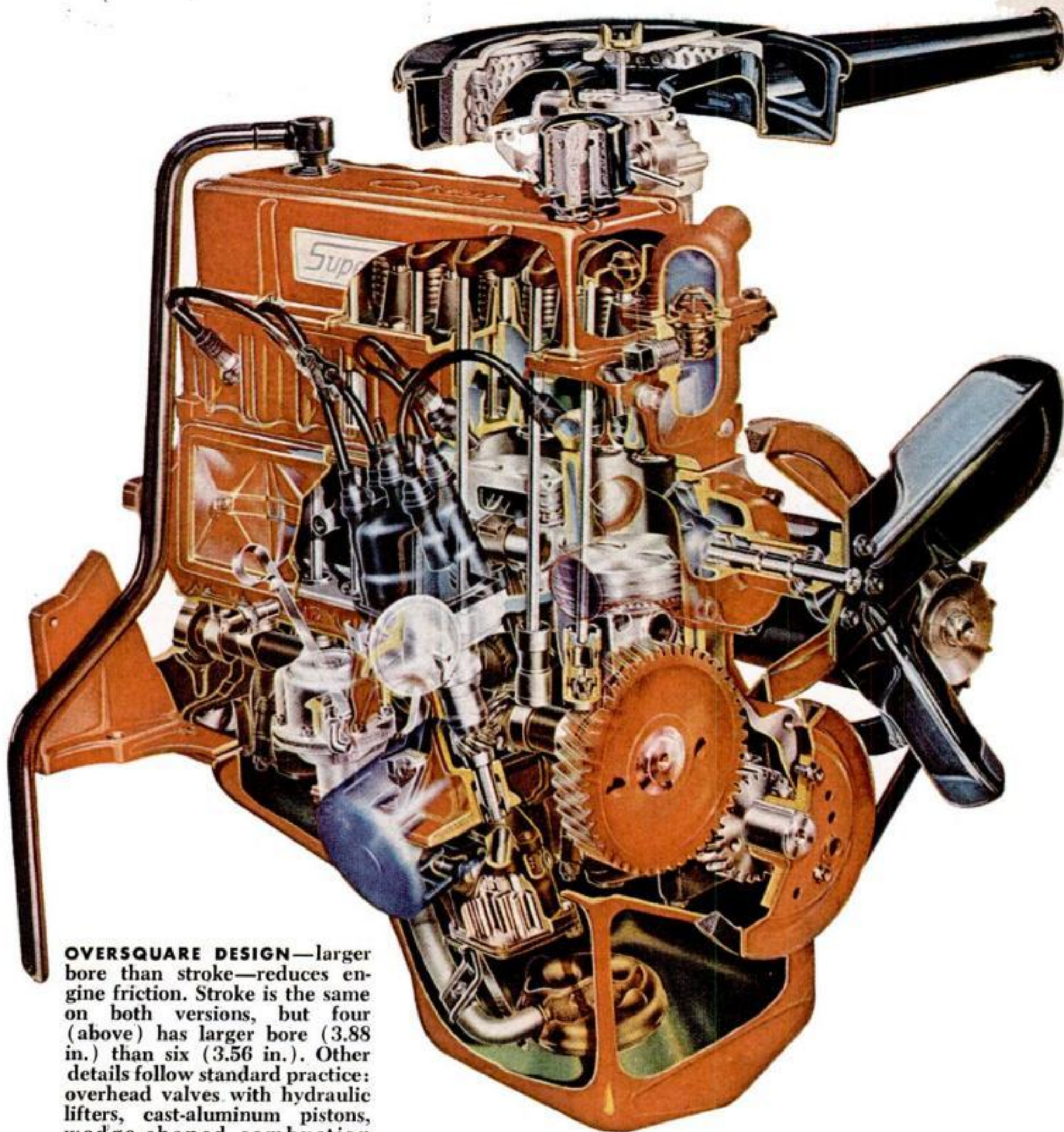
The '62 Cars Inside and Out

Pair of New Engines: Chevy II's Four and Six

ONE BASIC DESIGN with many shared parts makes two economy engines: 90 horsepower from four cylinders or 120 from six.

WHERE'S THE ENGINE? Like a two-year-old's foot in daddy's shoe, tiny four is nearly lost inside compartment dimensioned to hold six-cylinder version. With radiator set way back, a big "doghouse" shroud is needed to funnel air from the grille. The accessibility should make life easier for Saturday mechanics. Chevrolet hadn't made a four-banger since back in ancient times—1928, when a 487-lb. hulk wheezed out all of 35.5 hp. The new four gets nearly three times as many horses from a mere 360 lb., a weight reduction of 25 percent.

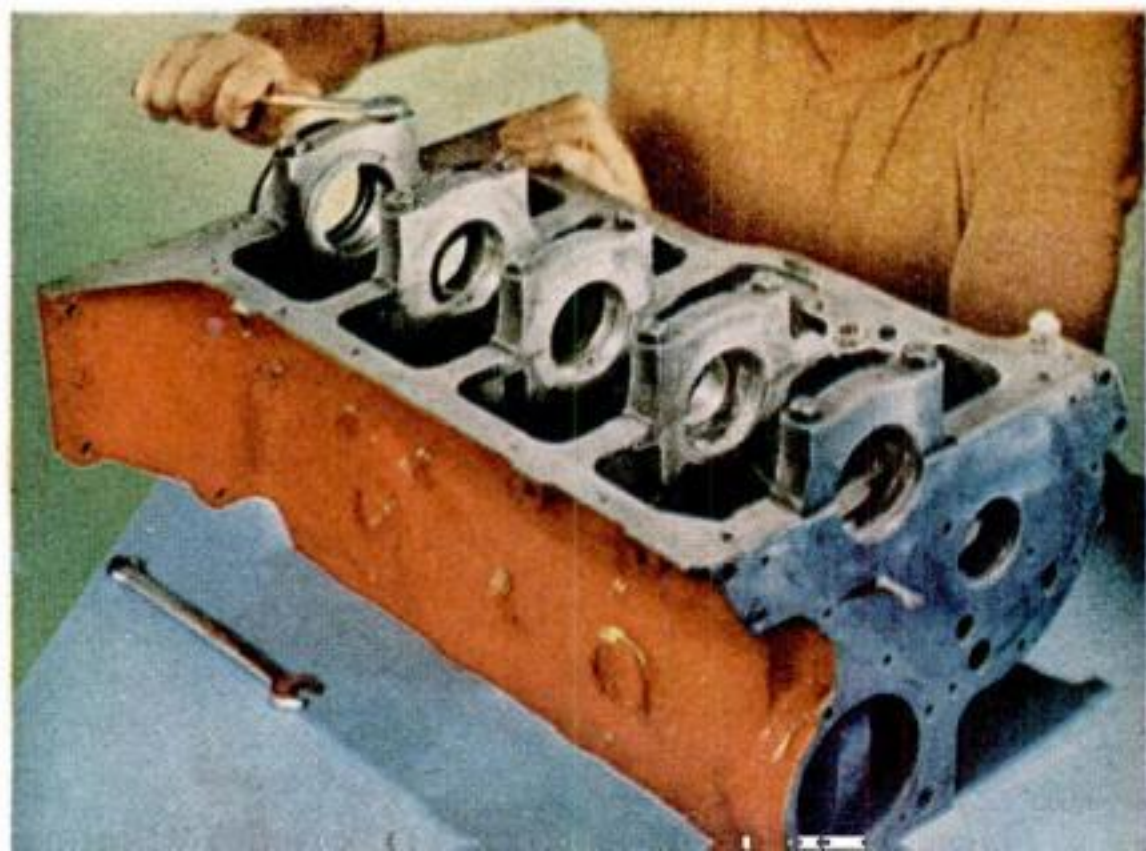




OVERSQUARE DESIGN—larger bore than stroke—reduces engine friction. Stroke is the same on both versions, but four (above) has larger bore (3.88 in.) than six (3.56 in.). Other details follow standard practice: overhead valves with hydraulic lifters, cast-aluminum pistons, wedge-shaped combustion chambers, a small single-barrel carb. Four-cylinder engine should enable Chevy II to approach fuel economy of Corvair, despite latter's size and weight advantage. The compression ratio is 8.5:1.

FIVE MAIN BEARINGS instead of standard three seem extraordinary luxury for economy job. One rumor: This unusual sturdiness will be put to use later by addition of a supercharger.

For more on the new engines, see p. 74



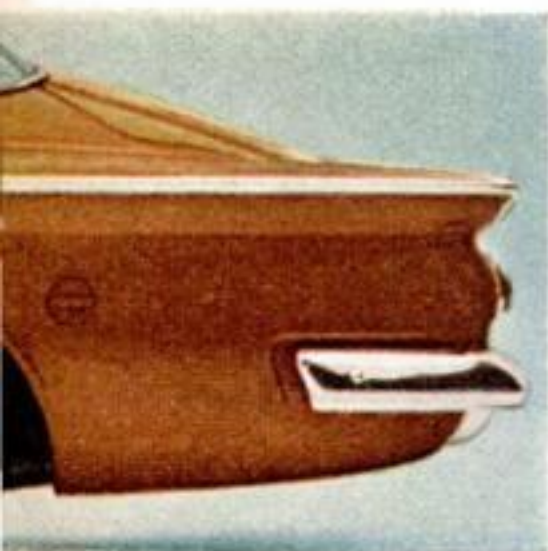


COMET'S higher trunk lid is squared off above lip. Clustered tail lights replace oval ones.

CHEVY II (center, left) is distinguished from other Chevrolet cars by size. It is 183 inches long, compared with Corvair's 180 inches (top) and standard Chevrolet's 209.6 inches overall (bottom).

The '62 Cars Inside and Out

The New Look



VALIANT has lost that dummy spare-wheel impression in the deck lid.



FORD runs a wider chrome spear from prow to stern. In another styling change, bulges at rear quarter panels have been removed.



MERCURY is easy to spot. Cone-shaped tail lights are in chrome scoops.



OLDS F-85 brand name has been raised from grille to lip of hood. Moldings are higher.



BUICK backup lights are inboard of tail lights. Deck lid bears a chrome-plated "wind split."



TEMPEST has undergone minimum changes. Its slanted fins are now brightened up with chrome.



DODGE has gone to Lancer-type rear sheet metal, with chrome decoration.



CHRYSLER tail lights climb up over a vestige of 1961's prominent fins.



PLYMOUTH drops fender "wings," adopts simpler concave grille with two headlight insets.

PONTIAC uses two big half-moon clusters to replace the oblong tail lights of last year.



on the Road



OLDSMOBILE moved oblong brightwork from behind headlight to door.

CADILLAC'S lowered fin lights up; indentation in sheet metal rounds off short of tail light.



STUDEBAKER LARK grille is overlaid with egg-crate pattern. All models have four eyes.



DODGE LANCER has a new, convex grille, but body lines are unchanged from last year.



BUICK SPECIAL tail lights wrap around, and rear sheet-metal panel is more simply sculptured.

FALCON sports a Thunderbird-type fake air scoop on hood, a grille with vertical lines.





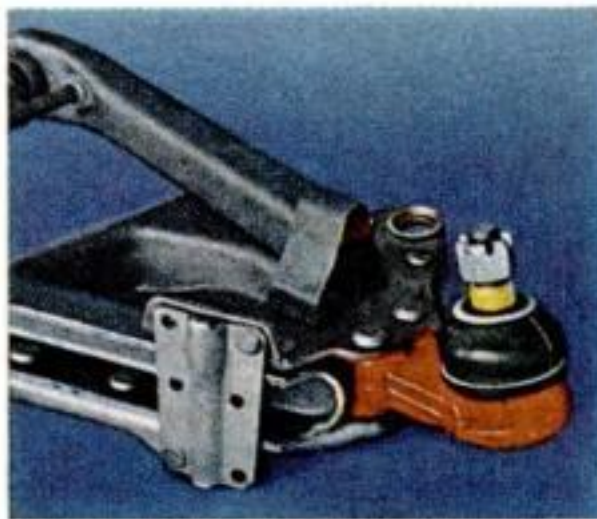
HAND-RAISED TOP for convertibles is back. Bright idea is to save money—no electric motors, hydraulics, or pushbuttons, just big coil springs on the levers. One puny girl can handle the spring-assisted top, they say. Cost-conscious design might bring price of this Buick Special convert below Chevrolet's.

The '62 Cars Inside and Out

Bright Ideas in the New Cars



HOT? Try Oldsmobile's split-level air-conditioner outlets. Above the customary nozzle is a separately controlled, smaller auxiliary outlet to direct cool air straight at your face. You just pull the button for a quick cooling off.

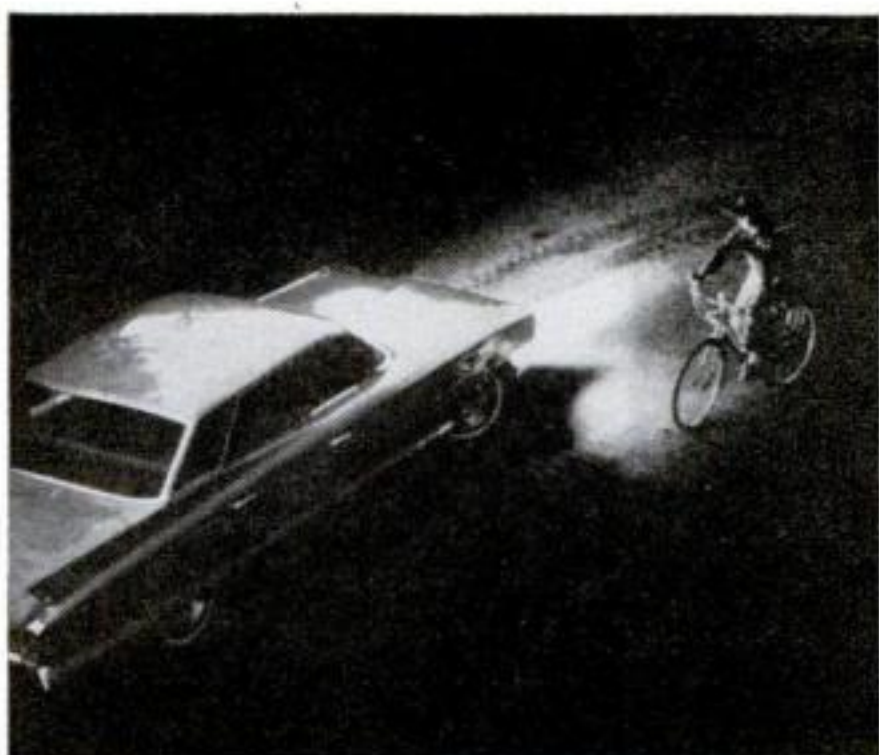


NO GREASING—FOREVER. This bit of machinery marks the end of an era. Using larger sealed cup provides life-of-the-car lubrication for ball-joint suspension. Oldsmobile now has eliminated all chassis greasing points.

STICK HYDRA-MATIC. If you want the sports-car look without marching through gears, Olds offers floor-mounted automatic-shift lever.



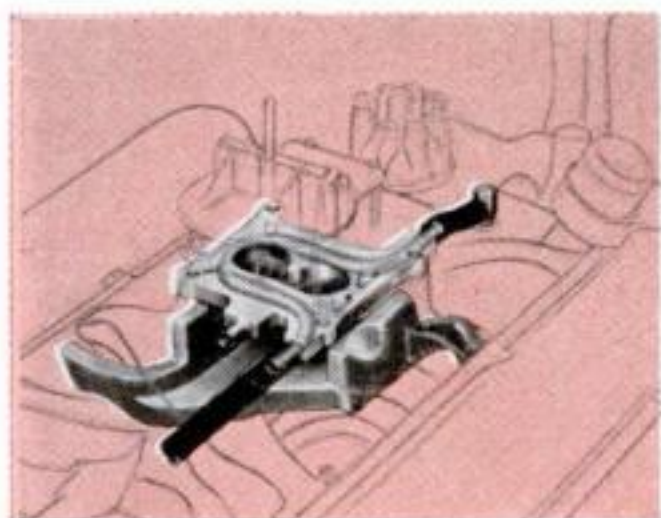
TRICKS WITH LENSES make Caddy back-up lights double as tail lights. Outer lens is clear (except for reflector button), shows all white in day. Tail light bulb has red filter; when it alone is on, entire lens glows red (top). With back-up light also on, it comes through bottom half of lens white; tail light keeps top red (lower photo). Unchanged fin light has red lens.



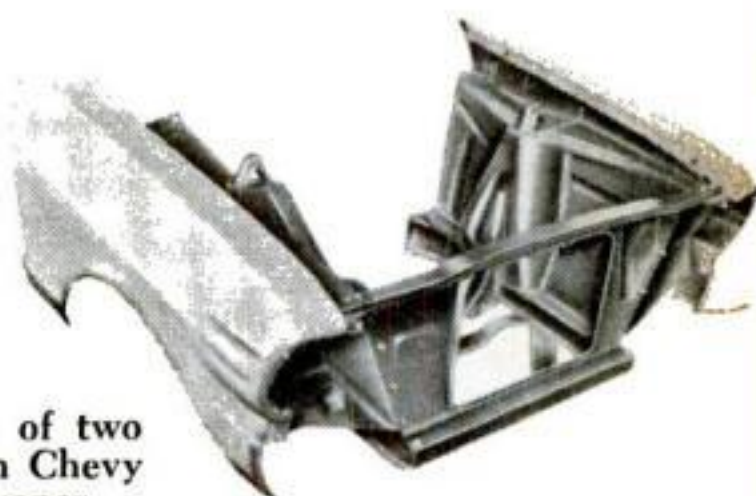
LIGHT TURNS CORNER: You see where you're going to go with Cadillac's around-the-corner lights that shine at 45 degrees to the side of the straight-ahead headlights. They work off the turn signal when the headlights are on.



YOU COULDN'T FORGET YOUR SEAT BELT if this experimental accessory, developed by Chrysler, were adopted. Wired through clasp, belt carries a low-voltage current that flashes a red light under dash when the belt is unfastened.



FASTER WARMUP on Merc is gained by using hot water as well as exhaust heat to warm intake gases. Water is routed through passage in carb mount. Exhaust crosses manifold.

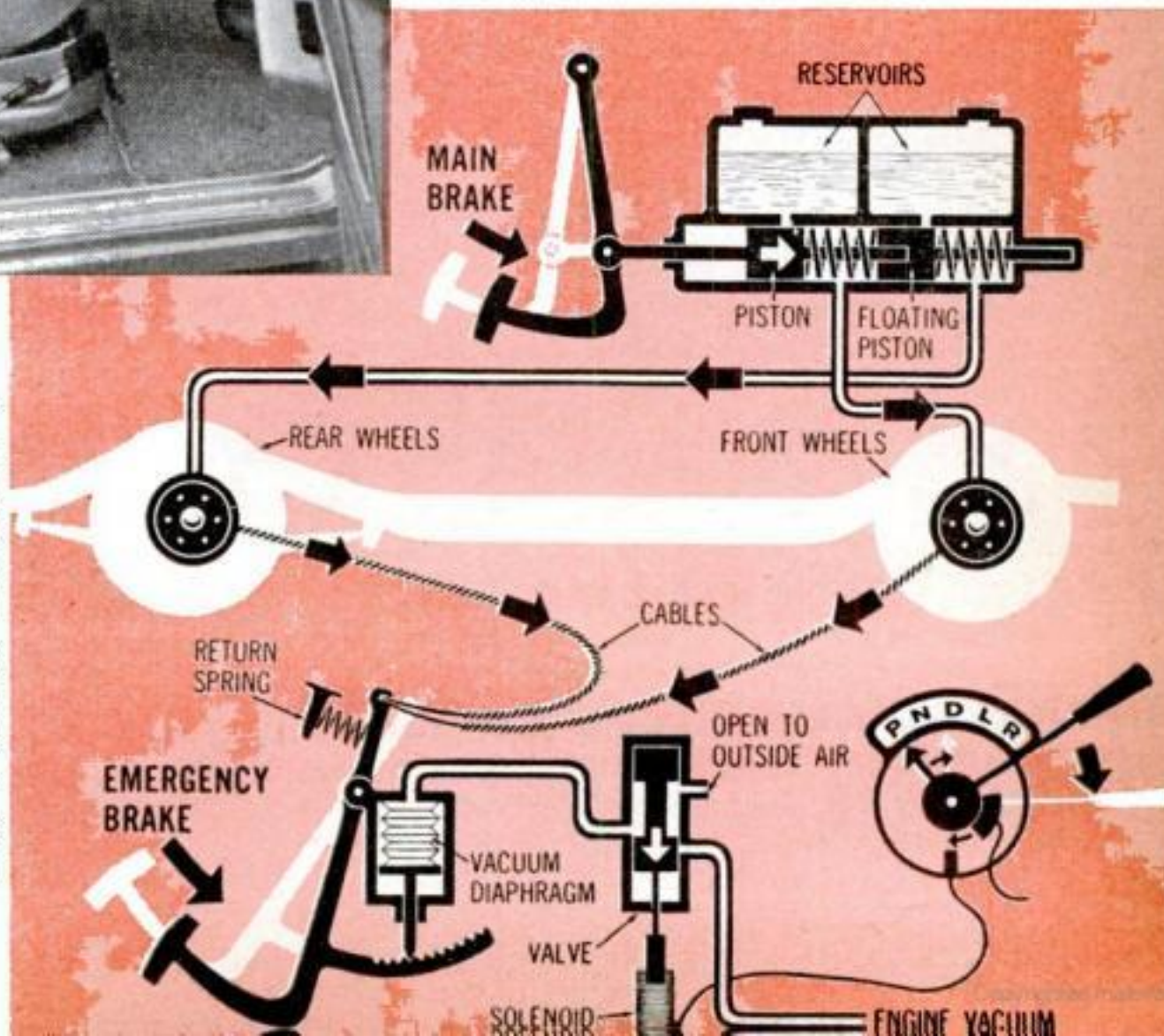


UNITIZED FRONT END, one of two basic body substructures in Chevy II, bolts firmly to body proper.



DO-IT-YOURSELF POWER SEAT is an option in Rambler American. Right front seat can be raised or lowered by pumping handle. Hydraulics do it.

TRIPLE-SAFE BRAKE SYSTEM for Cadillac consists of three separate parts that can be used independently of each other. It's a real Rube Goldberg—except that it works beautifully. Hydraulic brakes have two, not one, fluid reservoirs. If either loses fluid, the other one actuates front or rear brakes. If hydraulics fail completely, parking brake serves on highway. Its locking ratchet, which would prevent road use, is disengaged when transmission selector lever is set for driving.



The '62 Cars Inside and Out

What's New

BACK in 1928 the Chevrolet Motor Division closed its production line on a famous family of four-cylinder engines and went to sixes. Last month it announced a shocker—a return, after 33 years, to four cylinders in a new economy car.

Chevy's new overhead-valve four for '62 is the biggest single piece of news about automobile engines to come out of Detroit in a month of unveilings of the 1962 products. But there is other lively engine news, too:

- Buick has produced the first mass-output V-6 engine for a passenger car in the history of U. S. automobile manufacture. Ninety degrees separate its two banks—an oddity in itself. The engine is spunky. It's also a maverick—the cylinders do not fire at regular time intervals. They gallop.

That new Chevy four

WHY in the world did Chevrolet decide to produce a four-cylinder car after all these years? The answer: Because of the U. S. motorist's current preoccupation with economy (and, if the truth must be known, because of the runaway popularity of Ford's Falcon, miserly with its gasoline despite its six cylinders).

The Chevy four is as thoroughly conventional as the plot in a TV Western. But 33 years of experience have produced a lot of changes in the art of designing engines.

Take a look at these comparisons:

	1928 CHEVY 4	1962 CHEVY 4
BORE	3.688 in.	3.875 in.
STROKE	4.0 in.	3.25 in.
DISPLACEMENT . . .	194 cu. in.	153 cu. in.
COMPRESSION RATIO .	4.4:1	8.5:1
HORSEPOWER	35.5 @ 2,200 r.p.m.	90 @ 4,000 r.p.m.

The march of time. Here's proof of what has happened to engines and fuels in the last three decades: The 1928 Chevy engine toted 73.2 pounds of car per horsepower; the 1962 Chevy four's loading is only 27.8 pounds.

The new Chevy overhead-valve six,

Gallery of the '62s

What do the new cars look like? Better than ever, naturally. You can see for yourself in the gallery of photographs on this and the following seven pages. Two trends: a swing to the rectangular roof line pioneered by Thunderbird, and a big range in size, from truly compact compacts to luxurious dreadnoughts.



FORD



Under the Hood

● Chevy has not only a new four but a new, lightweight in-line six as well. Both power plants are tailored to the chrysalis-fresh economy car, the Chevy II.

● Like teenagers afflicted with growing pains, some of the second- and third-generation compact cars appearing for '62 are—perhaps inevitably—slyly nudging upward in their horsepower offerings.

● A few of the bigger cars have power plants so muscular that they abuse the credulity of the motorist. One promises no less than 409 horses.

Significantly, none of the new engines is built around an aluminum block. Cast iron is cheaper, and new manufacturing techniques have made possible thin-walled blocks without sacrificing sturdiness. So the weight advantage of aluminum is partly discounted.

optional in the II except for a fancy-pants model called the Nova where it's standard, is just as conventional as the four.

The regular Chevrolet six engine used in the big Chevrolets—a power plant so old in design that the memory of man runneth not to the contrary—was not considered for the new car because of its weight.

Here's how the two stack up:

	NEW CHEVY 6	REG. CHEVY 6
BORE	3.563 in.	3.56 in.
STROKE	3.25 in.	3.94 in.
DISPLACEMENT . . .	194 cu. in.	235.5 cu. in.
COMPRESSION RATIO .	8.5:1	8.25:1
HORSEPOWER	120 @ 4,400 r.p.m.	135 @ 4,000 r.p.m.
WEIGHT	450 lb.	608 lb.

Chevy's 1929 six, by the way, produced 46 hp.

The bigger Chevrolet six will continue as an option for economy-minded buyers of full-size Chevrolets.

A sharp eye will discover something fishy in the list of specifications on the two new engines. Detroit does nothing by happenstance. The four-cylinder engine has five main bearings, two more than actually necessary. The six has seven main bearings, again two more than necessary. It's common gossip that Chevy is prepared to supercharge both these engines in 1963 or 1964 with a new type of blower spun by exhaust gases. [See Detroit Report.]



PLYMOUTH



PONTIAC

CONTINUED

Buick's odd-ball six

ALTHOUGH Chevy's engine news is the biggest for '62, Buick's—mechanically—is the most interesting.

The basic facts on Buick's V-6 are simple. The engine, of cast iron, displaces 17 cubic inches less than the tidy aluminum V-8 in the compact Special.

The comparisons:

	V-6	V-8
BORE	3.625 in.	3.5 in.
STROKE	3.2 in.	2.8 in.
DISPLACEMENT	198 cu. in.	215 cu. in.
COMPRESSION RATIO	8.8:1	8.8:1
HORSEPOWER	135 @ 4,600 r.p.m.	155 @ 4,600 r.p.m.

A V-8 with 10.25:1 compression ratio, producing 185 hp., is an option.

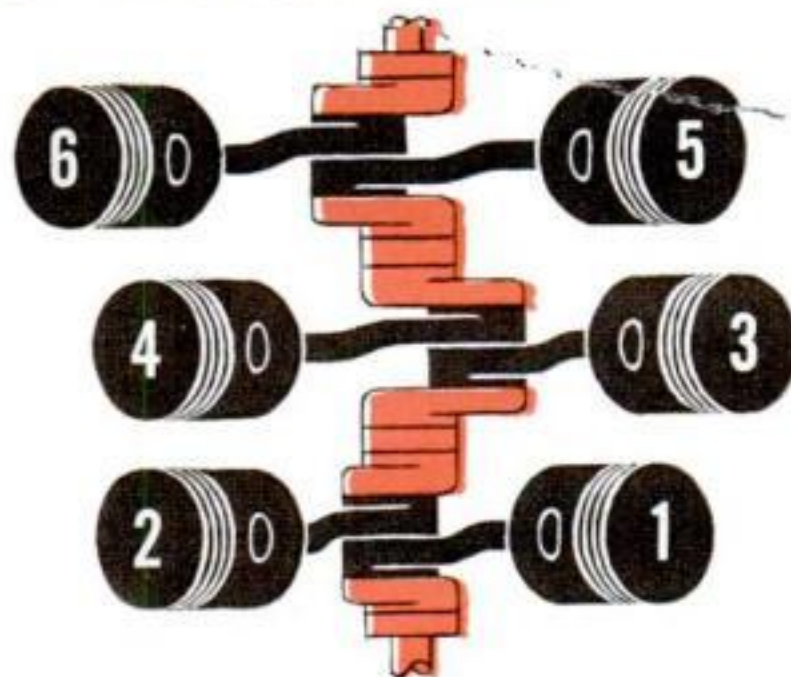
Buick has a straightforward reason for wanting a V-6: A cheaper engine would help reduce the price of the Special. But the background and design of this engine are anything but straightforward. Questions abound:

A V-6 by nature is a cantankerous piece of machinery. Why not a cylinders-in-line six, like Chevy's, proved by time? One answer to that is space. The Special's engine compartment was constructed for a V-8 block 20½ inches long. An in-line six would have had a block more than 28 inches long. Moreover, a V-6 would be lighter.

Another answer is that the V-6 would use a good many of the aluminum V-8's parts—valves and springs, timing chain, flywheel housing, and so on. The aluminum V-8 also has cylinder banks separated by 90 degrees.

That also answers part of the next question: Why a 90-degree six? Again, space. A lesser distance between the two banks—60 degrees, for example—would bang the hood against the engine.

With an aluminum V-8 in being, why go to a cast-iron V-6? Why not just lop off two of the V-8's cylinders as a switch



How the V-6 works

Pistons are numbered from front of engine. Three throws, each taking two connecting rods, are positioned around crankshaft 120 degrees of a circle apart. Firing order is 6-5-4-3-2-1.

Drawings A through D, illustrating sequence of firing and stages of pistons, show only four of the pistons. Remaining two merely repeat cycles described.

Drawing A: Piston 6 is firing; 5 is on compression stroke; 4 is finishing intake stroke; 3 is starting intake.

Drawing B: Piston 5 is firing 90 degrees of crankshaft rotation after 6; 6 is on power stroke;

on Pontiac's scissoring off one bank of its V-8 to create a four-cylinder engine for the Tempest? The answer: Cast iron is easier to work, a cast-iron engine easier to produce.

Not so cranky. The crankshaft has three throws, each taking two connecting rods. Why not six separate throws? Once more, space. Three throws make a shorter crankshaft.

Those three throws were the problem. It's not impossible to build a six-cylinder engine with three instead of six throws, each taking two con rods, with equally spaced firing intervals. But then the cylinders have to be in two banks spaced 120 degrees apart. Only with this ar-

Gallery of the '62s



TEMPEST



COMET



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